
**HOUSEHOLDS' CONSUMPTION AND
QUALITY PERCEPTIONS OF LOCAL (OFADA)
RICE IN SOUTH-WEST NIGERIA**

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Doctor of Philosophy in Agricultural Economics

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DECLARATION 1: PLAGIARISM

I, Ayodeji 'Seun OGUNLEKE, declare that:

1. The research reported in this thesis is my original research work;
2. This thesis has never been submitted for any degree or examination at any other university or institution of higher learning;
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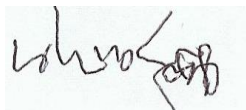
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DECLARATION 2: PUBLICATIONS

The following publications form part of the research presented in this study.

Publication 1 – Chapter three of this thesis.

Ogunleke A.O. and Baiyegunhi L.J.S. (2019). Effect of Households' Dietary Knowledge on Local (Ofada) Rice Consumption in South-West Nigeria. *Journal of Ethnic Foods* 6(24):1-11.

Publication 2 – Chapter four of this thesis.

Ayodeji Oluwaseun Ogunleke and Lloyd J.S. Baiyegunhi. Households' Segments Identification and their Perceptions of Local (Ofada) Rice Quality: Case of South-West, Nigeria. (Under review: *Scientific African*).

Publication 3 – Chapter five of this thesis.

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Publication 4 – Chapter six of this thesis.

Ayodeji Oluwaseun Ogunleke and Lloyd J.S. Baiyegunhi. Prototyping Local (Ofada) Rice Consumers in South West Nigeria: Misalignment Implications for Satisfaction and Loyalty. (Under review: *Economic Analysis and Policy*).

The data analyses and discussion of empirical results for all the above-listed publications were conducted in their entirety by Ayodeji 'Seun Ogunleke with technical advice from Prof. Lloyd J.S. Baiyegunhi. All Figures and Tables were produced by the same, unless otherwise referenced in the respective publications.

ABSTRACT

Rice has become an essential crop in Africa, with imports into the African continent accounting for more than a quarter of the world's trade in rice. It has become one of the fastest-growing food sources to both rich and poor households. In Nigeria's household food consumption, rice is the fifth most common food after tubers, vegetables, beans, and sorghum representing about 5.8% of households' spending. In recent years, local rice production has expanded significantly in Nigeria and is increasingly becoming an alternative to foreign rice with government's initiative to make the country self-sufficient in rice production under its Agricultural Transformation Agenda (ATA) and other policy initiatives put in place to address the local rice supply-demand gap. Following improvements in processing, polishing and packaging, many local rice brands with enhanced physical quality attributes that can compete favourably with imported rice brands are now available in Nigerian markets. Among these local rice varieties, local (ofada) rice is peculiar to but not limited to South-west, Nigeria and has been gaining international recognition in the recent time. The general objective of this study is to estimate households' consumption and quality perceptions of local (ofada) rice in South-west, Nigeria. A multi-stage random sampling technique was used to select 600 rice consuming households through a well-structured questionnaire. Different econometric techniques (IV-Tobit, Factor and cluster analyses, Hedonic pricing model, Kendall concordance test, Profile deviation analysis) were used to analyse the data.

The results of the descriptive statistics show that on the average, quantity of local (ofada) rice consumed by a household ranges from 6.19kg to 25.8kg per month with income ranging from ₦38,265.35 to ₦157,224.71. The dietary knowledge score registered an average of 4.67 (out of 10). Also, over 50 percent of the households are headed by male, 85 percent are married, 54.8 percent has family size of less than five people, while 50 percent of the participating households have two or more income earners.

The result of IV-Tobit reveals that dietary knowledge is significantly influenced by factors such as being a household meal planner or having a household member(s) on a special diet. Dietary knowledge as hypothesized, was found to positively influence the consumption of local (ofada) rice, as were some sociodemographic variables. The results of factor analysis show that households valued virtually all the local (ofada) rice attributes. Three clusters of local (ofada) rice consumers' households were identified under segmentation and each segment (cluster) has different concerns and interests towards local (ofada) rice variety.

Cluster 1 considered all the attributes of local (ofada) rice variety as important and was named meticulous cluster; cluster 2 valued physical appearance of the local (ofada) rice and was named extrinsic cluster; while cluster 3 was named casual because it was neutral to all the attributes considered for quality perceptions of local (ofada) rice, indicating a type of ethnocentric behaviour of the consumers.

The result of Kendall concordance coefficient shows 73.74% agreement in ranking quality attributes of local (ofada) rice by consumers' households. Colour, perceived nutrient level, taste, grain shape and rate of breakage were the most ranked quality attributes with Mean Attribute Ranking Scores (MARS) of 1.56, 1.69, 3.12, 5.53, and 5.86, respectively. Households are willing to pay Marginal Implicit Prices (MIPs) of ₦71.03 (\$0.20), ₦45.23 (\$0.13), ₦32.98 (\$0.09), ₦21.06 (\$0.06), and ₦14.41 (0.04), per kg for colour, grain cohesion, grain shape, perceived nutrient level and perceived chemical storage while discounting MIPs of ₦60.55 (\$0.17), ₦19.36 (\$0.05), ₦17.14 (\$0.05) and ₦6.00 (\$0.02) for texture, rate of breakage, perceived freshness, and low swelling capacity per kg of local (ofada) rice, respectively. The result of profile deviation analysis also reveals significant negative consumer satisfaction and loyalty implications of deviating from ideal consumer profile. Both consumer loyalty and consumer satisfaction have the same level of negative consequences. When considering the aggregate (total) profile deviation in both cases, the variance explained by the models are almost the same for satisfaction and loyalty. Moreover, when looking at the disaggregated Profile Deviation (PD) effects, both hedonistic value and trust are predicting negative consumer satisfaction and loyalty outcomes. This suggests that improving consumer satisfaction and loyalty have similar challenges and required same task. It is consumer hedonistic value and trust in local (ofada) rice that account for the significance of the total Profile Deviation result.

Therefore, this study recommends that nutritional information that are appealing about local (ofada) rice variety be introduced through advertisements on different media such as radio, television and print media. Also, a marketing-mix determination should be adopted, which involves developing and implementing a strategy for delivering an effective combination of want-satisfying features to consumers within target market for local (ofada) rice as the aim is to make the variety available across the country. In addition, modern rice processing and polishing that incorporate traditional technology are required to improve both extrinsic and intrinsic qualities (swelling capacity, rate of breakage, texture, etc.) of local (ofada) rice to enhance consumers' households acceptability, affordability and competitiveness. Lastly,

efforts should be made by the concerned authorities and stakeholders in the rice value chain in making sure that there is reduction in cost of production in order to lower the market price of local (ofada) rice and in extension, local rice generally.

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DEDICATION

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LIST OF ACRONYMS

ABP	Anchor Borrowers' Programme
ACGSF	Agricultural Credit Guarantee Scheme Fund
ADPs	Agricultural Development Projects
AfDB	African Development Bank Group
AMA	American Marketing Association
ATA	Agricultural Transformation Agenda
BARD	Bank for Agriculture and Rural Development
CACS	Commercial Agricultural Credit Support Scheme
CBN	Central Bank of Nigeria
CES	Consumer Expenditure Survey
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FAPRI	Food and Agricultural Policy Research Institute
FCS	Food Consumption Score
FMARD	Federal Ministry of Agriculture and Rural Development
FMI	Federal Ministry of Information
GAIN	Global Agricultural Information Network
GDP	Gross Domestic Product
GMO	Genetically Modified Organism
HHDS	Household Dietary Diversity Score

IITA	International Institute of Tropical Agriculture
IRRI	International Rice Research Institute.
ITC	International Trade Centre
KMO	Kaiser–Meyer–Olkin
LGAs	Local Government Areas
MIPs	Marginal Implicit Prices
MLE	Maximum Likelihood Estimates
NBS	National Bureau of Statistics
NCRI	National Cereal Research Institute
NCSER	National Centre for Solar Energy Research
OLS	Ordinary Least Square
OPEC	Organization of Petroleum Exporting Countries
PD	Profile Deviation
RBDA	River Basin Development Authorities
SAP	Structural Adjustment Program
SEM	Structural Equation Model
SSA	Sub-Saharan Africa
USAID	United States Agency for International Development
USDA	United State Department of Agriculture
VIF	Variance Inflation Factors
WARDA	West African Rice Development Association
WFP	World Food Programme
WHO	World Health Organisation

1.1 Background

The global importance of rice production and consumption is seen in its provision of more than 20.0% of caloric needs of millions of people on a daily basis (Yang and Zhang, 2010). Globally also, in terms of annual world production and consumption of major cereals, rice ranks third as the most produced and consumed cereal after maize and wheat (FAO, 2012). Nigeria in this respect, like all other rice consuming nations, has experienced a surge in domestic demand for her rice since 1970 (Obih and Baiyegunhi, 2017; Odusina, 2008). This has resulted in rice being a strategic staple dietary household item in Nigeria, especially among middle and low income groups (Kanu and Ugwu, 2012). The annual consumption of milled rice in Nigeria increased from 0.4 million metric tons in 1960 to approximately 5.2 million metric tons in 2013, reflecting an annual average growth rate of 7.2% [International Rice Research Institute (IRRI), 2013]. In Nigeria's household consumption, rice is the fifth most common food after tubers, vegetables, beans, and sorghum representing about 5.8% of households' spendings (Johnson, *et al.*, 2013).

The per capita annual consumption of rice in Nigeria accelerated from 1.6 kg in 1960 to approximately 31.6 kg per annum in 2013, an increase driven by growth in population, urbanization, increases in per capita income, and changes in preferences for rice meals (Gyimah-Brempong, *et al.*, 2016; Omojola, *et al.*, 2006). For instance, the average annual growth rate of population increased from 2.2% in the 1960s to 2.9% in 2013 (World Bank, 2014). This population growth induced a rapid increase in food consumption, especially rice. Similarly, since 1970, Nigeria has consistently experienced increase in per capita income due to inflows of petro-dollars, pushing up food per capita consumption in general and rice per capita consumption in particular. These increases in per capita income have been responsible for some of the changes that have occurred in Nigerians' consumer taste and preferences for rice predominantly (Abayomi, *et al.*, 2010).

However, outputs from local rice production in Nigeria is not commensurate with the increase in demand for rice since 1970, resulting in the widening of the local supply-demand deficit (Damisa, *et al.*, 2013). As a result, the annual increase in local rice production lags significantly behind the annual increase in local demand. This slow growth in local rice

production has widened the gap between local supply and demand for rice in Nigeria, revealing that self-sufficiency ratio in terms of local production is on a continuous decline. However, to halt this annual deficit, Nigeria has expended substantial foreign exchange earnings to import rice (Amusan and Ayanwale, 2012).

In fact, the inability of the rice subsector to produce enough rice for local consumption reflects the neglect of the subsector over the years by successive governments. A situation traced mainly to the shift of emphasis by government's annual expenditure associated with the discovery of crude petroleum in the 1970s (Nchuchuwe, 2012). As earnings from crude petroleum became the most important contributor to government revenue, emphasis of government expenditure shifted, to the detriment of the agricultural sector (Abbass, 2012). An important outcome of petro-dollar inflow is the downgrading of agricultural pursuits, thus making agricultural activities less profitable and less attractive to the youths.

Given these developments, the Federal Government of Nigeria initiated policies between 2011 and 2013 to intervene in the agricultural sector in general and the rice subsector in particular (Adesina, 2012). By and large, these public policies reflect actions of government to tackle future occurrence of a societal problem (Chamon and Kaplan, 2013), as the rice subsector policies were formulated in order to reduce the dependence on international rice market to meet local rice demand. The policy initiatives put in place were intended to address the local rice supply-demand gap i.e., factors believed to be inhibiting higher productivity and the inability of the local rice subsector to meet local demand.

These policies, programs, and projects include The National Fertilizer Policy, National Seed Policy, Land Use Policy, National Extension Service Policy, Agricultural Credit Guarantee Scheme Fund (ACGSF), Commercial Agriculture Credit Scheme, National Irrigation Policy, Government Guaranteed Minimum Producer's Price, Rice Trade Policies, and Rural Development Programs. Moreover, the Federal Government of Nigeria also simultaneously created several agricultural institutions, agencies, research institutes and universities to implement these policies and programs. These institutions include Agricultural Development Projects (ADPs), River Basin Development Authorities (RBDA), Bank for Agriculture and Rural Development (BARD), National Cereal Research Institute (NCRI) and other research institutes. The federal, state and local governments also encourage rice farmers to form cooperative societies so as to enhance their creditworthiness and to enable them benefit from these policies, programs, and projects.

Furthermore, the federal, state and local governments are using the platform of the Presidential Initiative on Rice to augment these policies and programs. The strategic themes of the Presidential Initiative on Rice include: the introduction of a 100% duty levy on imported polished rice, and 50% duty rebate on imported brown rice, and encouraging the entry of major private sector players with cognate experience in value chain management (e.g., Olam and Veetee) into the rice processing business (FMARD, 2011). Currently, many new modern rice mills are being established while others are being expanded as government is encouraging the establishment of about 100 modern rice mills across the country (FMI, 2012). With the expansion of cultivated land areas and improvements in processing, polishing and packaging, many local rice brands with improved physical quality attributes that can compete favourably with imported rice brands are now available in the Nigerian urban markets.

A survey carried out by Pro-poor Opportunities in Commodity and Service Markets Project (Propcon, 2012), on modern rice processing confirmed the effect of various government initiatives on improving processing and ensuring good quality of local rice varieties. It discovered a notable improvement in rice processing in Nigeria compared to the 1990s. The improvement in rice processing according to the report was attributed to a locally produced destoner in Nigeria, and which was efficient in removing stones, dirt and other impurities present in local rice. Another factor in the improvement of rice processing in Nigeria as reported by Propcon is the drying process. The traditional sun drying has been replaced by mechanical dryers or improved sun drying methods. This type of dryer is found all over the country and can process about 3000 kg of rice whilst removing 50% of its moisture in six hours. Apart from this mechanical dryer which uses diesel or electricity, other dryers have been developed such as solar dryer for drying rice paddy. An example of this, is one developed by National Centre for Solar Energy Research (NCSER), Sokoto, Nigeria; Developed as a result of incessant power outage all over the country. The solar dryer comes equipped with a fan to enhance hot air distribution over the rice paddy.

1.2 Problem Statement

Although, Nigeria is the largest producer and consumer of rice in West Africa and in sub-Saharan Africa (SSA), its local rice supply-demand deficit has persistently expanded. Also, in spite of the fact that Nigeria's local rice production has increased since the 1990s, the increase has not been sizeable enough to satisfy local rice demand (Johnson *et al.*, 2013).

Consequently, this has resulted in a large domestic supply-demand gap, leading to massive importation of rice products (Aminu, *et al.*, 2012).

The imbalance between Nigerian rice cultivation and consumption is a significant long-term concern. According to the outlook from the Food and Agricultural Policy Research Institute's (FAPRI) Database, (2007), the local demand for rice and allied products was projected to rise to 7.2 million metric tons by 2018, while local production of milled rice is projected to reach only 3.7 million metric tons. By implication, the local supply gap of 3.5 million metric tons must be filled by the importation of rice in order to avoid hunger and disease by 2018. Thus, Nigeria will need to allocate more foreign exchange earnings for the importation of rice in order to meet local supply gap in the future (GAIN, 2012).

Estimates, however, showed that locally milled rice output as a ratio of total domestic demand defined as self-sufficiency ratio was 75.0% in the 1960s and 1970s. This dropped to 68.4% in the 1980s and 1990s and has trimmed down steadily to 53.8% by 2013. The problem of massive importation of rice in Nigeria is better appreciated by the available statistics that show Nigeria as the second largest global importer of rice after China in 2013 (USDA, 2012). Some selected indicators for Nigeria's rice economy is presented in Table 1.1.

Table 1.1: Selected Indicators for Nigeria's Rice Economy

Indicators	1960-79	Average		
		1980-99	2000-10	2011-13
Milled Rice Production (MMT)	0.3	1.3	2.2	2.9
Growth rate of production (%)	2.9	11.3	3.6	4.0
Milled Rice Consumption (MMT)	0.4	1.9	3.9	5.2
Growth rate of consumption (%)	8.0	8.4	5.0	3.5
Share of rice imports in food imports	75.0	68.4	56.4	53.8

Notes: Data sourced from International Rice Research Institute [IRRI] Database: Retrieved from <http://ricestat.irri.org:8080/wrs2/entrypoint.htm> and Food and Agricultural Policy Research Institute [FAPRI] Database: Retrieved from <http://www.fapri.iastate.edu/outlook2007/>

Available data on formal rice import also revealed an average increase of 12.8%, 8.6% and 3.5% per annum during the periods 1980-1999, 2000-2010 and 2012, respectively. The volume of formal rice import, nevertheless increased drastically to about 2.0 million metric tons, reflecting an annual average growth rate of 6.0% in 2013 as shown in Table 1.2.

Table 1.2: Selected Indicators for Nigeria's Rice Imports

Indicators	1960s	1970s	Average			
			1980-99	2000-10	2012	2013
Volume of rice imports (MMT)	0.1	0.2	0.6	1.8	1.9	2.0
Growth of imports (%)	5.0	256.3	12.8	8.6	3.5	6.0
Value of rice import(US\$ million)	0.2	84.1	115.7	443.1	1,920.2	2,041.3
Food imports (US\$ million)	65.8	749.9	1,223.8	2,756.8	11,433.3	12,153.6
Share of rice imports in food imports	0.4	5.3	15.7	16.8	16.8	16.8

Notes. Data sourced from the International Rice Research Institute (IRRI) Database (<http://ricestat.irri.org:8080/wrs2/entrypoint.htm>), Food and Agricultural Policy Research Institute (FAPRI) Database (<http://www.fapri.iastate.edu/outlook2007/e>), and the Central Bank of Nigeria (CBN) 2012 Annual Report and Statement of Accounts (<http://comtrade.un.org/db/dq>).

Similarly, the value of rice import increased steadily from an average of US\$0.2 million in the 1960s to about an average of US\$84.1 million per annum in 1970s. The value of rice imports, however, doubled up to an average of US\$442.3 million per annum between 2000 and 2010 and moved up rapidly to about US\$1,920.2 million in 2012 and an estimated \$2,041.3 million in 2013 (see Table 2). As a share of total value of food imports, rice imports expanded from an average of 0.4% per annum in the 1960s to an average value of 5.3% per annum in 1970s and moved upward to 15.7% per annum between 1980 and 1999. Rice imports further increased in 2013 to a share of 16.8% of total food import. Their share of visible imports was also estimated at 6.6% in 2012 (CBN, 2012).

The desire to stem increasing local rice supply deficit and reverse persistent rice importation prompted Federal Government policy actions and interventions. These government actions and interventions were further motivated by available evidence that Nigeria is naturally endowed with viable ecologies suitable for massive cultivation of different rice varieties and therefore should not rely on importation of rice to feed her population (Adesina, 2012).

Consequently, Nigeria has been motivated to introduce initiatives designed to promote domestic rice production in order to achieve self-sufficiency through import restrictions and investments to improve product output and quality. The country has embarked on this path which is shown in the unprecedented attention being given to improving the postharvest segment of the rice value chain in order to improve quality and compete more effectively with imports (Adesina 2012). Furthermore, improving both the quality and marketing of domestic rice has been revealed to be more important than increasing paddy productions (Demont *et al.*, 2013). In other words, simply growing more rice paddies will not guarantee

the displacement of imports so long as the processing sector is unable to absorb the increase or improve product quality. The critical question at stake is whether these positive signs and ongoing efforts are going to be sufficient for Nigerian local rice to compete more effectively with imported ones over time or not?

1.3 Justification of the study

Most of the previous studies on rice consumers' behaviour had focused mostly on the determinants of rice demand and the influence of consumers' socioeconomic characteristics on the demand for rice (Odusina, 2008; Kassali *et. al.*, 2010; Erhabor and Ojogho, 2011; Ogundele, 2014). Recently, some studies conducted in Nigeria have suggested strategies for switching consumption preference to local rice brands (Ogundele, 2014; Gyimah-Brempong *et al.*, 2012; Oyakhilomen, 2014; Obih and Baiyegunhi, 2018). None of these researches aimed at quality improvement for grain especially local rice in Nigeria and have not effectively impacted on market integration. However, understanding consumers' level of awareness of health benefits accrued from local (ofada) rice is imperative as this will likely help to increase consumption. Ideally, an understanding of dietary knowledge will most likely inform consumption of healthy foods (Yen *et al.*, 2008). In this vein, Chokshi (2018), asserted that in the United States, wealthier people are healthier because they choose better diets, are well informed about their diets and more physically active, which is a reflection of disparities in diet and health. Also, since local (ofada) rice is a credence food product whose quality cannot be evaluated even after it has been bought or consumed (Bonroy and Constantatos, 2008), it is important to see how deviation from ideal consumer of this local rice brand affects loyalty and trust which might pose a severe obstacle to local (ofada) rice consumption.

Research has shown that 'ofada' rice which is one of the locally produced rice in Nigeria has more health benefits than the imported varieties. Osaretin *et. al.*, (2007) found that local (ofada) rice variety contains higher proteins at raw, cooked, and soaked states when compared to imported rice. Additionally, Ofada rice has a rough surface, vital elements such as phosphorous, and fibre which helps in the reduction of the risk of bowel disorder whilst fighting constipation particularly. It also contains an appreciable amount of selenium which has been found effective in fighting colon and breast cancer (Ayinde, *et. al.*, 2013). With all these qualities and benefits of local rice, there is no doubt that Nigerian local rice can compete effectively with and even displace imported varieties basically on its self-worth in

value. So, the Nigerian Government only needs to maintain its planned policies and programs and be more focused on improving product quality and developing marketing strategies in making local rice more attractive to the consumers.

Thus, there is the need to know the influence of recent efforts by government and stakeholders in ensuring that consumers' consumption of local rice brands increase, through addressing some important knowledge gaps on households' consumption behaviours for local (ofada) rice such as (a) understanding if households' dietary knowledge affect the consumption of local (ofada) rice?; (b) identifying different households segments and their quality perceptions of local (ofada) rice; (c) estimating the maximum price(s) consumers are willing to pay for local (ofada) rice brand quality attributes; and (d) understanding the effect of deviating from ideal consumer of local (ofada) rice on satisfaction and loyalty. This study has attempted to bridge these identified gaps with respect to local (Ofada) rice in South-west, Nigeria.

1.4 The research questions

In view of the above problem, this study aims to provide answers to the following research questions:

- i. Do households' dietary knowledge influence local (ofada) rice consumption decision?
- ii. What are the quality attributes influencing implicit prices paid by households for local (ofada) rice variety?
- iii. Could local (ofada) rice consuming households be segmented in terms of their quality perceptions?
- iv. What are the implications of deviating from an ideal local (ofada) rice consumer for satisfaction and loyalty?

1.5 The objectives of the study

In the context of Nigeria's rice industry, the general objective is to estimate households' consumption and quality perceptions of local (ofada) rice in South-West, Nigeria. The specific objectives are to:

- i) determine the effect of households' dietary knowledge on local (ofada) rice consumption;
- ii) examine households' acceptability of local (ofada) rice based on quality attributes;

- iii) identify households' segments and their perceptions of local (ofada) rice quality; and
- iv) understand misalignment implication of prototyping local (ofada) rice consumers for satisfaction and loyalty.

1.6 Hypotheses

- H₁*: Households' dietary knowledge (e.g. higher protein, fibre, lower water content etc.) do not influence its decision to consume local (ofada) rice.
- H₂*: There is no significant relationship between segmented consumer groups and socio-demographic factors of local (ofada) rice consumers' households.
- H₃*: Total deviation from the ideal profile of the baseline consumers will lead to a negative effect on (a) consumer satisfaction; and (b) consumer loyalty.

1.7 Outline of the Thesis

The remaining part of this study is organized into six chapters. In chapter 2, theoretical and empirical survey of literature relevant to the study are presented. It begins with the geographical and climatic description of Nigeria, and followed by an emphasis on the importance of agriculture in Nigeria's economy. Some key concepts relating to the study are also defined as theoretical and empirical evidence on dietary knowledge, hedonic price function, quality perceptions, household segmentation, and profile deviation analysis. The remaining chapters consist of four studies, each addressing the specific objectives stated in section 1.4 in relation to the households' consumption and quality perceptions of local (ofada) rice, while the last chapter discusses the summary, conclusion, policy implications, and recommendations. The following highlights the core of the study.

- I. **CHAPTER 3: *Determining whether or not Households' Dietary Knowledge Affect Consumption of Local (ofada) Rice***: According to Null (1978), nutritional awareness is the first step to good health. However, little or no information is available as to how dietary guidelines influence consumers' decisions to purchase certain foods (Yen *et al.*, 2008). This study adopts the method of Yen *et al.* (2008) using Maximum Likelihood Estimates in which dietary knowledge was endogenized by hypothesizing that knowledge is affected by factors which may or may not directly influence local rice consumption. Furthermore, food consumption data from cross-sectional surveys often contain a notable proportion of observations not consuming specific food items.

The system of censored equations with an endogenous regressor was constructed because statistical procedures not accommodating censoring or endogeneity can produce biased estimates.

- II. **CHAPTER 4: *Examining households' acceptability of local (ofada) rice based on quality attributes***: This study employs Hedonic Price Model to identify some attributes of local (ofada) rice that justify its acceptability by the households. Kendall's Coefficient of Concordance was used to rank quality attributes of local (ofada) rice to determine their level of importance (whether good or bad) when purchasing the rice variety. In line with Naseem *et al.*, (2013), the study examined the relationship between implicit prices paid by households based on key local (ofada) rice attributes as observed in the market, then evaluates the economic value of the attribute in question. Based on Griliches (1971) framework, the study formulated a conceptual model for further empirical estimation by relating the price of local (ofada) rice to its quality attributes. This study assumes a linear functional relationship exists between the price of local (ofada) rice and its attributes. Through this, a hedonic price function was used to derive marginal implicit price for local (ofada) rice through its attributes.
- III. **CHAPTER 5: *Identifying households' segments and their perceptions of local (ofada) rice quality***: In order to explore households' quality perceptions of local (ofada) rice, factor analysis was conducted. Local (ofada) rice qualities were grouped under five factors as suggested by the exploratory analysis namely: Benefits, Experience, Search attributes, Intrinsic trait and Extrinsic quality. Based on this, confirmatory factor analysis was then performed for the factor patterns. Lastly, cluster analysis was employed to identify household segments and their perceptions of local (ofada) rice quality.
- IV. **CHAPTER 6: *Prototyping Local (Ofada) Rice Consumers in South West Nigeria: Misalignment Implications for Satisfaction and Loyalty***. This study is built on the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) (Teng and Wang, 2015). Both theories (TRA and TPB) postulate that individual behavioural intentions depend on, among many other factors, attitudes toward the behaviour. These theories assumed that individual decision-making is rational, which points to the importance of reasoning attitudes in predicting behaviour (Ajzen and Fishbein, 1980). A fundamental reasoning motive of local (ofada) rice consumer behaviour concerns about health (Yen *et al.*, 2008). However, reasoning is not the

only component of attitudes but there is also affective elements (Ajzen, 2001, Agarwal and Malhotra, 2005; Kim *et al.*, 2007). Thus, it is essential to include reasoning and affective elements in behaviour models (Aertsens *et al.*, 2009), especially for local (ofada) rice consumption. Profile Deviation Analysis (PDA) was used to understand the misalignment implication of ideal local (ofada) rice consumers for satisfaction and loyalty.

- V. **CHAPTER 7: *Conclusions and Recommendations*:** Finally, conclusions and policy implications, as well as recommendations for further study emanating from this study, are presented in chapter 7.

CHAPTER 2

Literature Review

2.1 Geography and Climatic Conditions of Nigeria

Nigeria is a tropical country located between the equator and Tropic of Cancer. It has a land area of 923,768 km² and a coastline of 853 km, and lies on latitude 10° North and longitude 8° East. The climatic conditions are determined by south westerlies and north easterlies. The south westerlies contain a lot of moisture, which emanates from Atlantic Ocean but north easterlies are hot and dry winds that come from Sahara desert (Abdulkadir *et al.*, 2013). Therefore, two distinct seasons are found in the country: dry and wet. The dry season starts around November and ends about March, while the wet season lasts from April to October (Ozor, *et al.*, 2015). However, the climatic conditions vary between southern and northern parts of Nigeria (Macaulay, 2014). As a result, rainy season occurs between March and November each year in the south, while in the northern part, it starts in July and ends around September. Similarly, dry season period in the southern part of the country begins in November and lasts until March, while in the north it runs between October and May in each year. The average temperature per year is 26.4 °C (80 °F) and the average annual rainfall is 1,626 mm (64.0 in), with an average of 121 days of rainfall per year. Average annual relative humidity is about 84.7%, with an average of 1,885 hours of sunlight per year (Oluyole *et al.*, 2013).

There are different types of major soil zones in Nigeria, with significant variations between southern and northern locations (Oku, 2011). Common soil types in the northern part of Nigeria are loose sandy soils (consisting of wind-borne deposits) and river sands. Clay soils can be found towards the riverine areas of southern zone. According to official estimates, agricultural land area in Nigeria is about 79 million hectares, constituting 85.9 percent of total land area of 92 million hectares. Of the 79 million arable land area, only about 34 million or 42.0 percent is currently been cultivated for all crops, livestock, and forestry products (Nwanakoala and Osigwe, 2013). Forest and savannah are the main vegetation types commonly found in the country, with their distribution affected by rainfall distributions and patterns, and human activities such as bush burning, cultivation, tree harvesting, and cattle grazing (Ladan, 2014).

2.1.1 Macroeconomic Environment

Nigeria has the largest economy in Africa and, the 26th largest economy in the world (National Bureau of Statistics [NBS], 2014). Nigeria is currently the biggest oil producer in Africa, the 7th-largest oil producer in the Organization of Petroleum Exporting Countries (OPEC), and the 13th-largest producer in the world (OPEC, 2013). The country's gross domestic product (GDP) was estimated at approximately U.S. \$509.9 billion in 2013. Real income per capita was also estimated at US \$2,258 per annum. Real economic growth has also been robust at an average annual growth rate of 6.2 percent between 2004 and 2013 (NBS, 2013). In terms of sectoral contributions to real economic growth, the share of services sector to GDP in 2013 accounted for 51.1 percent; agriculture and industrial sectors had shares of 23.3 percent and 11.2 percent, respectively. The crude oil and natural gas sector's contribution to economic growth was 14.4 percent (CBN, 2013).

2.2 Agriculture and Nigerian Economy

The Nigerian economy was predominantly agriculture prior to the emergence of crude oil and natural gas sector in 1970, contributing more than 40.0 percent of GDP. Although agriculture remains very vulnerable, it still accounts for about 70.0 percent of total employment [African Development Bank Group (AfDB), 2014]. Between 1960 and 2013, agricultural sector recorded an average annual growth rate of 6.5 percent. The sector remained the major supplier of food and raw materials to industries and generates family incomes for majority of the population. According to Akpan (2012), agricultural sector in Nigeria is however, dominated by smallholder producers who are operating farm sizes of not more than 1 to 5 hectares. However, these smallholder farmers accounted for over 90.0% of agricultural output.

The sector is comprised of different subsectors: cash crops, forestry or tree crops, fisheries, food crops, and livestock. The food crops subsector remained the dominant crops produced and these include cereals (sorghum, millet, maize, and rice), tubers (cassava, yam, and cocoyam), vegetables and horticultural products. Although Nigeria leads the world in production of yams and cassava, it lags behind the rest of the world in the production of many cereal crops (FAOSTAT, 2013). To this extent, the country is heavily dependent on importation of cereals to meet domestic supply-demand gap. Massive rice importation is more feasible in the total cereals importation.

2.3 Trends and Structure of Rice Production

Nigeria, since 1990s, recorded substantial increase in local rice production however, the increase has not been sizeable enough to cover the growing local rice demand. For example, output of paddy rice increased from an average of 0.4 million metric tons in 1960-69 period to an average of 4.5 million metric tons per annum in 2011- 2013 period. The increase between 1960 and 2013 period reflected an average growth rate of 6.1 percent per annum. The growth in paddy rice output was however more significant in the 1980-1989 period, recording an average increase of 22.6 percent per annum. Between 1990 and 1999, the annual increase of paddy rice production however slowed down to 1.1% (Table 2.1). This dismal performance of the sector during this period was traced to policy inconsistency in trade policies (Iwuchukwu and Igbokwe, 2012). However, paddy rice production recovered marginally and grew by an average of 3.3 percent per annum in 2000-2010 periods.

Table 2.1: Indicators of Rice Production in Nigeria

<i>Years</i>	<i>Nigeria</i>		<i>West Africa</i>		<i>% Share of Nigeria</i>	
	<i>Paddy Rice</i>	<i>Milled Rice</i>	<i>Paddy Rice</i>	<i>Milled Rice</i>	<i>Paddy Rice</i>	<i>Milled Rice</i>
1960-1969	369.6	245.7	1,725.6	1,150.4	21.9	21.8
1970-1979	536.0	356.5	2,548.2	1,698.8	21.1	21.1
1980-1989	1,355.0	866.1	4,171.1	2,780.8	30.6	29.6
1990-1999	3,029.9	1,817.9	6,397.7	4,265.1	47.3	42.6
2000-2010	3,558.7	2,194.9	8,762.6	5,841.8	41.0	37.8
2011-2013	4,451.1	2,852.4	12,290.5	7,634.4	36.8	37.4

Source: International Rice Research Institute [IRRI] Database.

Despite the growth in paddy rice production, percentage of paddy rice milled has remained low and accounted for an average of 63.8% per annum of total paddy rice during the period 1960 to 2013. This relative small share of milled rice to paddy rice output suggests large wastages at milling and processing segments of the rice value chain. This is attributed to poor Head Rice Yield supplied to mills, which is the most important quality parameter to millers (Asante *et al.*, 2013). In terms of rice production in West Africa sub-region, Nigeria is the largest single producer of rice. Between 1960 and 2013, average annual production of paddy and milled rice in Nigeria accounted for 36.8 percent and 37.4 percent of total sub regional paddy and milled rice productions, respectively.

Table 2.2: Regional Contributions to National Rice Output

Regions	Output in Thousand Metric Tons					
	2000	2005	2010	2011	2012	2013
North-East	672.3	725.1	846.2	876.6	922.2	970.2
North-West	966.2	1,045.0	1,216.1	1,259.8	1,325.4	1,294.2
North-Central	1,192.9	1,290.2	1,501.5	1,555.4	1,636.4	1,591.5
South-East	211.4	228.6	266.0	275.6	289.9	305.0
South-West	130.0	140.6	163.6	169.5	178.3	187.6
South-South	109.4	118.3	137.7	142.6	150.1	157.9
Federal Capital Territory	15.8	17.1	19.9	20.6	21.7	22.8
Total	3298.0	3567.0	4151.0	4300.0	4524.0	4529.2

Adapted from 'Rice Data Systems in Nigeria: Building a Rice Data System for sub-Saharan Africa (National Rice Survey 2009)''

A review of states' rice output produced showed wide disparities across the federated states. Those states within the rich plains of major rivers and subsidiaries such as River Niger, River Benue and Chad Basin, which provide excellent conditions for rice cultivation have continued to dominate in paddy and milled rice production. Thus, Kaduna State accounted for 20.2 percent of national paddy rice output. The second biggest producer was Niger State (16.0%), while the share of Benue State as the third largest producer was 9.8 percent. Similarly, Taraba State held the fourth position and accounted for 6.8% of national rice output. In terms of geopolitical zones, the North-Central geopolitical zone contributed 35.2 percent to national rice output (Table 2.2). The contributions of other remaining zones were: North-West (28.6%), North-East (21.4%), South-East (6.7%), South-West (4.1%) and South-South (3.5%).

Table 2.3: Contributions of Production Systems to National Output in thousand metric tons

System							Average
	2000	2005	2010	2011	2012	2013	2000-2013
Upland	1,352.2	1,462.5	1,701.9	1,763.0	1,854.8	1,951.3	1,536.6
Lowland	1,385.2	1,498.1	1,743.4	1,806.0	1,900.1	1,998.9	1,574.0
Irrigation	319.9	346.0	402.6	417.1	438.8	461.6	363.5
Mangrove	240.8	260.4	303.0	313.9	330.3	347.4	273.6
Total	3,298.0	3,567.0	4,151.0	4,300.0	4,524.0	4,759.2	3,747.7

Adapted from 'Rice Data Systems in Nigeria: Building a Rice Data System for sub-Saharan Africa (National Rice Survey 2009)''

A review of paddy rice output between 1960 and 2013 showed that the lowland and upland cultivation systems accounted for an average of 42.0% and 41.0 percent respectively, of the national rice output. However, the irrigation cultivation system share was low compared to other developed countries, accounting for only 9.7 percent of the total national paddy rice output. Similarly, the deep water/mangrove cultivation system had a share of 7.3 percent in national rice output (Table 2.3).

Gray,*et al.*, (2014) opined that expansion in land area, increase in yield per hectare, intensification in agricultural cultivation, increase in research on new varieties of seeds, adaptation of new technologies, expansion in irrigation system, and increased public expenditure in agriculture as a percentage of GDP were responsible for the growth in agricultural productivity in Central Asian countries. Chiefly, a combination of these factors such as significant expansion in rice area cultivation, increased yield through new high yielding varieties of rice and increase in input supplies by government were responsible for the expansion in paddy rice output in Nigeria (CBN, 2012).

2.4 Trends and Structure of Rice Consumption

Milled rice is widely consumed in Nigeria as household food item and is also used by industries to produce other rice-based food and pharmaceutical products (Alfred and Adekayode, 2014). In some instances, the paddy rice is used in the production of animal feedstock. Thus, the major industrial rice consumers in Nigeria are food and drink industries (for example, pasta and bread industries, beer and other liquor distilleries), and pharmaceutical companies. Nigeria has been recording steady growth in demand for rice by households, industries and livestock feeds manufacturers since 1970. Nigerians consume different types and grades of rice. At household level it is consumed as boiled or fried with stew or it is used to prepare special dish such as ‘tuwo’. However, different cultures in Nigeria have distinct preferences regarding taste, texture, colour and stickiness of rice varieties that they consume (Oko *et al.*, 2012). Thus, Nigeria consumers’ preferences of rice varieties particularly local milled rice are linked to the grain and cooking qualities. The rural population consumes more of locally milled rice and in particular ofada rice. However, preference is different with urban population preferring imported rice, especially long grains. Rice consumption by households has increased consistently since 1970s and is now an important staple cereals and food item in households’ food expenditure (Table 2.4).

Table 2.4: Selected Indicators of Rice Consumption in Nigeria

	Consumption (MT)	Growth Rate (%)	Shares of W/A (%)	Per Capita (KG)	Growth Rate (%)
Nigeria					
1960-1969	246.8	1.7	16.9	4.9	-2.3
1970-1979	505.6	13.7	52.7	7.6	7.9
1980-1989	1262.5	8.0	53.0	14.9	1.8
1990-1999	2432.5	8.8	35.5	22.4	1.8
2000-2009	3744.7	4.9	38.0	26.9	0.6
2010-2013	5102.3	4.3	40.0	31.0	1.6
2014	5558.0	2.5	40.1	31.5	-0.4
West Africa					
1960-1969	1458.5	5.5	-	12.9	3.2
1970-1979	2398.0	7.8	-	16.9	5.4
1980-1989	4589.2	5.2	-	25.6	2.0
1990-1999	6852.6	3.2	-	32.4	1.1
2000-2009	9125.8	3.5	-	26.9	0.6
2010-2013	10964.9	3.1	-	35.2	1.3
2014	13849.3	4.0	-	36.5	1.5

Data sourced from International Rice Research Institute [IRRI] Database. The population data used was obtained from World Development Indicators, 2013. The consumption data is presented in thousand metric tons. The consumption per capita, was defined as the total annual consumption divided by the annual population and it is given in kilograms per year, and W/A means West Africa.

Milled rice consumption by households grew from an average of 0.3 million metric tons per annum in 1960s to 0.5 million metric tons per annum in 1970s. This represents an average annual growth of 13.7 percent per annum. Although the average annual rate of increase slowed down after 1970s, however the annual increase in the quantity of milled rice consumed has persisted. Total consumption increased to an average of 5.1 million metric tons in 2010-2013 period, representing an average increase of 4.3 percent per annum. Total volume of rice consumption in 2014 was estimated at 5.6 million metric tons, representing an increase of 2.5 percent over the level in 2013 (Table 2.4).

The increase in consumption of rice in Nigeria is better appreciated from an analysis of the trend in per capita consumption in the past five decades. Per capita consumption increased

consistently from an average of 4.9 kg per year in 1960s to an average of 22.4 kg per year in 1990s. Also, it accelerated to 31.0 kg between 2010 and 2013 period and increased marginally to an estimated 31.5 kg per year in 2014. The persistent increase recorded in per capita consumption thus far, showed that rice product has become a major food staple, while this trend is anticipated to continue over the next four decades (Ogunsumi *et al.*, 2013; Adesina, 2012).

In terms of West-Africa sub-region rice consumption, Nigeria remained the biggest consumer of rice in the sub region. A comparative analysis showed that consumption of rice by consumers in Nigeria accounted for about 16.9 percent of the 1.5 million metric tons of rice consumed in the sub region in 1960s. This increased to an average of 52.9 percent of the 3.4 million metric tons of rice consumed by sub regional consumers in 1970s and 1980s. By 1990s, the share dropped substantially to 35.5 percent of 6.9 million metric tons, while it rose to 40.0 percent of 12.8 million metric tons sub regional total consumption between 2010 and 2013. This increased further slightly to 40.1 percent of the estimated 13.8 million metric tons of rice consumed in the sub region in 2014 (Table 2.4).

The persistent increase in per capita consumption is attributed to a combination of factors such as rising population, growth in per capita income, rapid urbanization and changes in occupational structure of citizens, which induced changes in food preferences by working and urban housewives (GAIN, 2012). For example, in the past five decades, Nigeria witnessed rapid increase in population. The population grew from 45.9 million in 1960 to 171.6 million people as at mid-2013 (U.S. Population Reference Bureau, 2013), representing an average annual increase of 2.5 percent.

Table 2.5: Population Growth and Rice Consumption

<i>Years</i>	<i>Annual increase in in population</i>	<i>Number of times</i>	<i>Annual increase consumption</i>	<i>Number of times</i>
1960-1969	2.2	1.0	1.6	3.6
1970-1979	2.7	1.3	13.7	2.5
1980-1989	2.6	0.9	8.0	25.0
1990-1999	2.4	0.9	8.8	0.0
2000-2010	2.5	1.1	5.5	1.2
2011-2013	2.7	1.1	3.5	7.6
1960-2013	2.5	1.3	7.2	5.3

Data sourced from International Rice Research Institute [IRRI] Database and United States Population Reference Bureau (2013). World Population Data Sheet. The number of times was calculated as the growth rate in 2013 divided by the growth rate in 1960.

According to Population Action International (2011), “increasing number of people often drive up demand for food, which results in additional use of agricultural land and water”. Population growth in Nigeria is associated with demand for additional food including of rice product. Table 2.5 shows a simple relationship between rising population and increase in rice consumption in Nigeria. The country recorded an average increase of 2.5 percent per annum in population, meaning an increase of 1.3 times in population between 1960 and 2013. This perhaps induced an average increase of 7.2% per annum or 5.3 times of households’ rice consumption in the same period. This was even more visible during 1970s through 1990s, as annual increase in consumption of rice of 10.1% could be traced to the average annual increase in population of 2.6% per annum in the same period.

Table 2.6: Growth in Per Capita Income and Rice Consumption

<i>Years</i>	<i>Annual increase in Per capita income</i>	<i>Number of times</i>	<i>Annual increase in per capita consumption</i>	<i>Number of times</i>
1960-1969	3.2	0.2	1.6	3.6
1970-1979	14.9	0.2	13.7	2.5
1980-1989	16.3	3.7	8.0	25.0
1990-1999	28.7	0.8	8.8	0.02
2000-2010	30.9	1.0	5.5	1.2
2011-2013	11.0	0.7	3.5	7.6
1960-2013	21.2	2.3	7.2	5.3

Sourced: International Rice Research Institute [IRRI] Database and CBN, database.

Nigeria has also experienced significant increase in gross national income translating to higher income per capita. In the literature, the relationship between per capita income and per capita food consumption is anchored on consumer behaviour theory. The consumer behaviour theory assumes that consumers allocate limited money income among available goods and services, which is aimed at maximizing utility. Therefore, as income rises, per capita food consumption is expected to increase (MacInnis, 2011). Omojola et al. (2006) suggested that the increase in consumption per capita of rice in Nigeria is attributed to increase in income per capita. They further suggested that the increase over the years was even more relevant with the consumption of foreign rice, thus indicating that rice is a normal good. According to Johnson *et al.* (2013), income elasticity of rice consumption in Nigeria is estimated at 0.63 and was found to be higher in rural sector compared to urban areas.

Table 2.6 explains a formal relationship between per capita income and rice consumption in Nigeria. Between 1960 and 2013, Nigeria recorded an average increase of 21.2 percent per annum in nominal per capita income or about 2.3 times. This induced an average growth of 7.2 percent per annum or 5.3 times in rice consumption by households. The increase in demand for rice was however, prominent in 1970s as demand for rice rose by an average of 13.7 percent per annum or 2.3 times in reaction to less than 1 time or 14.9 percent annual increase in per capita income. The increase in rice consumption in relation to per capita income so far can be visualized formally, by comparing the budget share of rice consumption in food basket that is the amount of household income spent on purchasing rice product. The budget share (BS) of a consumer good is clearly defined as price of the commodity multiplied by quantity consumed divided by total consumer spending or income (Cirera and Masset, 2010). According to Nigeria Bureau of Statistic (NBS) Consumption Pattern Survey (2012), rice consumption among all staples and total food purchases occupied the fifth position and accounted for 9.9 percent and 8.9 percent, respectively. In terms of budget share, it accounted for 5.8 percent of total consumer spending. While rural consumers spend about 10 percent of their total income on rice, urban consumers spend about 9.8 percent.

Rapid urbanization in Nigeria also accounted for major changes in lifestyles of citizens, leading to shifts in preferences or taste in favour of rice meals. Nigeria has experienced high rural-urban migration and the aftermath were changes in occupational structures of many households and increased involvement of women in the workforce (Ango *et al.*, 2014). Thus, the relative ease of preparing rice meals compared to other traditional cereals thus, has contributed immensely to the shift in preferences for rice meals from other traditional staples.

2.5 Supply-Demand Gap Analysis

Rice self-sufficiency is defined as a ratio of local rice consumption to local milled rice production (Peljor and Minot, 2010). Table 2.7 replicates a scenario that showed rising trend in milled rice supply deficit in Nigeria, from 1,100 metric tons in 1960s to 2.4 million metric tons in 2013. Between 1960 and 2013, Nigeria has persistently imported foreign milled rice to augment local supply deficit. This was an average of 2.3 million metric tons of imported rice per annum. Self-sufficiency ratio has also declined from 99.6 percent in 1960s to 55.3 percent in 2013. The long-run self-sufficiency ratio of the rice value chain between 1960 and 2013 stood at 55.1 percent. The balance of 44.9 percent during this period was imported to meet local demand for rice. Thus, despite recorded increase in international price of rice, the country in the past five decades has experienced rice import surges between 1970 and 2013.

Table 2.7: Selected Indicators of Rice Supply-Demand Dynamics in Nigeria

<i>Years</i>	<i>Production</i>		<i>Consumption Milled Rice</i>	<i>Supply Gap</i>	<i>Sufficiency Rate %</i>	<i>Import %</i>
	<i>Paddy Rice</i>	<i>Local Milled Rice</i>				
1960-1969	369.6	245.7	246.8	-1.1	99.6	0.4
1970-1979	536.0	356.5	505.6	-149.1	70.5	29.5
1980-1989	1,355.0	866.1	1,262.5	-396.4	68.6	31.4
1990-1999	3,029.9	1,817.9	2,432.5	-614.6	74.7	25.3
2000-2010	3,558.7	2,194.9	3,848.8	-1653.9	57.0	43.0
2011	4,300.0	2,709.0	4,921.0	-2212.0	55.0	45.0
2012	4,524.0	2,850.0	5,175.0	-2325.0	55.1	44.9
2013	4,529.2	2,998.2	5,423.0	-2424.8	55.3	44.7
2011-2013	4,451.1	2,852.4	5,173.0	-2320.6	55.1	44.9

Notes. Data sourced from International Rice Research Institute [IRRI] Database. Retrieved from <http://ricestat.irri.org:8080/wrs2/entrypoint.htm> and Central Bank of Nigeria Annual Report and Statement of Accounts. Data are in thousand metric tons otherwise as indicated.

Available data explain that rice importation in terms of volume and value into Nigeria has constantly increased since 1970. However, these changes have been erratic depending on the different trade regimes and tariff structure in each year. These changes have been described as import surges (Table 2.7). de Nigris (2005) argued that an import surge has the following characteristics: an increase in volume of import relative to local production, import of the commodity is a threat to local production, the increase is a recent phenomenon, sudden, sharp and significant enough in quantity and quality and the import is large enough to cause a major distress or serious injury to the local industries.

Grethe and Nolte (2005) also defined import surge to mean a situation in which the volume or value is sudden, significant and is in excess of a normal level. Thus, available statistics on volume and value of rice imports by Nigeria indicated that Nigeria experienced rice import surges in 1970s, 2000-2010 and between 2011 and 2013 periods. Thus, these import surges were the major source of concern to the Federal Government, thus justifying the specific interventions and initiatives to reduce dependence on foreign rice import by increasing locally produced paddy and milled rice.

The volume and value of rice import by Nigeria has increased since 1970s. For instance, the volume and value of rice import rose from averages of 199,400.0 metric tons and U.S\$108.6 million per annum in 1970s to averages of 3.0 million metric tons and U.S\$1,868.9 million per annum in 2011-2013 periods. Between 1960 and 2013, both volume and value of rice imports increased by 55.2 percent and 86.4 percent, respectively. Its share in total food imports (includes food and live animals, beverages and tobacco, oils seeds, oil nuts and oil kernels) increased speedily to a level of 33.6 percent in 2011-2013 periods (IRRI, CBN). A special examination showed that the growing rice import into Nigeria is influenced by factors other than export price of rice. For example, in 1970s, rice import by volume increased when export price was highest at U.S\$493.4 for a metric ton. Similarly in 2000-2010 and 2011-2013 periods when export price of the commodity increased by 11.3percent and 4.7 percent, the volume of imports also increased sharply by 4.2 percent and 6.2 percent, respectively (CBN).

Table 2.8: Distribution of Sources of Rice Imports to Nigeria (2009-2013)

Regions/Continents	<u>In Percent</u>				
	2009	2010	2011	2012	2009-2012
Asia	8.0	6.0	12.5	57.6	21.0
Americas	68.0	84.8	84.5	42.1	69.9
Middle East	12.0	4.0	2.3	0.1	4.6
Europe	11.4	2.6	0.0	0.0	3.5
Africa	0.7	2.6	0.7	0.0	1.0
Oceania	0.0	0.0	0.0	0.1	0.0
Oceania	100.0	100.0	100.0	100.0	100.0

Note. Data compiled from Comtrade Database, United Nations Trade Statistics Division.

Therefore, the increasing rice import is attributed to four economic reasons. First, the importation of rice is dictated by the instability in domestic supply of rice, due to production

and cost inefficiencies along the rice value chain. Second are unilateral and frequent changes in Federal Government rice trade policies either due to external pressures or by internal pressures from different interest groups. These actions lower the competitiveness of local producers compared to their counterparts elsewhere. Third are the frequent changes in agricultural financing policy as there are frequent changes in inputs subsidy policies. These frequent changes produce disincentive to higher production by the local rice farmers. Finally is the lingering issue of quality of local milled rice compared to imported rice (Abayomi *et al.*, 2010).

Rice imports into Nigeria came from diversified sources of which American continent export on the average was about 69.9 percent per annum (Table 2.8). The most significant source of rice import from the American continent to Nigeria was Brazil. Rice import from Brazil accounted for an average of 68.1 percent of total rice import between 2009 and 2012. The level of rice import from the Asian continent stood at an average of 21.0 percent per annum. However, rice trade between the Asian countries and Nigeria had witnessed substantial increase in recent years, rising from 8.0 percent in 2009 to 57.6 percent in 2012. The main trading partners from the Asian continent were: India (13.7%), Thailand (2.8%) and China (1.4%).

2.6 Overview of Nigeria's Rice Sub-Sector Policies

Agricultural policies in Nigeria have evolved since independence in 1960. In 1998, after years of neglect, the Federal Government launched an agricultural policy with a sole objective of ensuring food security for the country and specifically, to improve the production of cereals. Among the cereals, rice was a major target and the policy was aimed at improving producers' efficiency, raising local rice output and reversing rice importation. However, following implementation difficulties, the Federal Government in 2011, reformulated a new agricultural policy called the Agricultural Transformation Agenda. The overall objectives of the new agenda include: self-sufficiency in basic food supply and the attainment of food security, increased production of agricultural raw materials for industries, increased production, and processing of export crops and generating gainful employment (Federal Ministry of Agriculture and Rural Development, [FMARD] 2011).

Following the Agricultural Transformation Agenda, the Federal Government has developed the new rice subsector policy/program. The new policy has the following objectives: an appropriate increase in national output of rice, curbing the level of importation of rice from

other countries, reducing the amount of scarce foreign exchange devoted to rice importation, creating employment and enhancing rice farming households' incomes, developing and diversifying the export base of the country. In the circumstance of the new policy, in 2013 the Federal Government relaunched the Presidential Initiative on Rice. Globally, common strategies used to implement the rice subsector policy are: rice commodity pricing policy, rice trade policies (import quotas, export quotas, tariffs, direct export and import bans, etc.), and rice input subsidy policy (seed, fertilizer and chemicals), credit policy, extension services policy and public investment in rice production (Obih and Baiyegunhi, 2017).

In Nigeria, the achievements of the rice subsector objectives are targeted with the following strategies: rice trade policy, inputs subsidy policy, and policies on access to: credit, land and extension services. In addition, the Federal Government and sub national governments have also put in place paddy rice minimum guarantee price policy and have also used public investment in irrigation, agricultural machineries, fertilizer production and agricultural education on the rice subsector to induce higher producers' efficiency and local output in the subsector (FMARD, 2011). For instance, the re-launched Presidential Initiative on rice has the following strategic themes: introduction of 100% duty levy on imported polished rice; distribution of R-boxes to rice farmers; introduction of 50% duty rebate on imported brown rice; attraction of donor-supported initiatives, implementation of an outright ban on rice importation by 2015 and encouragement of large-scale rice milling investors both foreign and local. Thus, the rest of this section discusses the relevant policies explained above and employed by the Federal Government to promote rice subsector productive efficiency and by extension local rice output.

2.7 Nigeria Rice Trade Policy

Federal Government used trade policy (import quota, tariffs, import restrictions and import bans) to regulate international trade in rice so as to protect local producers in Nigeria (Miranda, *et al.*, 2010). The use of rice trade policies in regulating rice import dates back to 1970s. Emodi and Madukwe (2008) categorized the national rice trade policy into three distinct periods namely; pre-ban period (1971-1985), ban period (1985-1994), and post-ban period (1995-to-date). These actions were largely dictated by internal and external environments, which were inclusive of world supplies, prices of rice at both domestic and international markets and the multiplicity of interest groups. The pre-ban period covered 1971 to 1985 and is broadly divided into pre-crisis period (1971- 1978) and crisis period

(1979-1985). The pre-crisis period was a period of implementation of trade liberalization and the use of moderate import tariffs in the spirit of world trade. Thus, between 1971 and 1978 rice import tariff ranged from 10 percent to 20 percent except in 1974 when the tariff was 66.6 percent (Table 2.9).

Table 2.9: Chronology of Nigeria Rice Trade Policies

Period	Policy Measures
Pre Ban Period	
Prior to April 1974	66.6% Tariff
April 1974-April 1975	20% Tariff
April 1977-April 1978	10% Tariff
April 1978-June 1978	20% Tariff
June 1978-October 1978	19% Tariff
October 1978-April 1979	Imports in containers under 50kg were banned
April 1979	Imports placed on restricted license only for Govt. Agencies
September 1979	6-month ban on all rice imports
January 1980	Import license issued for only 200,000 metric tons of rice only
October 1980	Rice under import restrictions with no quantitative restrictions Presidential Task Force (PTF) on rice was created and issued allocations to customers and traders through Nigeria National Supply Company (NNSC)
May 1982	PTF began the issue of allocation directly to customers and traders in addition to those issued by NNSC
January 1984	PTF disbanded and rice importation placed under general license
Ban Period	
October 1985 to 1994	Importation of rice banned as Structural Adjustment Program was introduced and all commodity boards were disbanded
Post Ban Period	
1995	100% Tariff
1996-2000	50% Tariff
2001	85% Tariff
2002	100% Tariff
2003	150% Tariff
2004	75% Tariff
2005-2006	100% Tariff
2007	109% Tariff
2008	0-30% Tariff- This was 0% Jan-Sept, and 30% by Oct.
2009	30% Tariff
2010	30% Tariff
2011-2012	50% Tariff
2013	110% Tariff
2014	110% Tariff

Notes: Compiled from UNEP (2005), Nigeria Tax Data Card, 2013 and Federal Government Budgets of Nigeria for various years

From 1979, Nigeria began to experience balance of payment problems, resulting in a rapid depletion of foreign reserves. This subsequently induced a crisis within the economy. Therefore, to strengthen the economy, trade liberalization was re-appraised and the Federal Government re-introduced drastic measures to curtail rice import.

Sequel to this, in 1979 import quota and quantitative restrictions became the major instruments. However, the implementation of these tools came with the introduction of rice import license policy. The process was massively abused, thus leading to rent seeking activities by various interest groups. These trade policy instruments were not effective as anticipated. As a result, in 1986 following the introduction of Structural Adjustment Program (SAP), Federal Government imposed an outright ban on rice import, which lasted till December, 1994. One major outcome of this ban was the emergence of illegal trade on rice imports through the land borders of Nigeria with the neighbours thereby, dampening the achievement of the intentions of the ban policy. Due to pressures from various actors, the outright ban was jettisoned in 1995. The instrument used so far, was imposition of heavy import duty although the annual imposed tariffs had never been consistent but generally erratic. The tariff ranged from 50 percent in 1996 - 2000 and 2010 - 2012 periods to 150 percent in 2003.

2.8 Households consumption preference for imported and domestic rice brand in Nigeria.

According to Akaeze (2010), in a study on consumer preference for imported rice in Nigeria: perceived quality differences or habit persistence, revealed that habit persistence and consumers' perception of quality differences are both significant and important in explaining consumer preference for imported rice in Nigeria. The magnitudes of habit persistence and perceived quality differentials were estimated to be 0.491 and 0.176, respectively. Thus, any given amount of locally consumed rice only generates about one-fifth as much utility as the same amount of imported rice. The resulting strong preference for imported rice may have resulted from a cultural mind-set that foreign products are of higher quality than domestic products, rather than actual quality differences between the products.

Lancon *et al.* (2003) conducted a survey on consumer's preferences for imported rice and suggest that imported rice cleanliness is the overwhelming technical feature explaining the wider acceptance of imported rice among rice consumers in Nigeria at the cost of local rice market development. Next to cleanliness are swelling capacity (mostly preferred by

restaurants and fast food joints), taste, availability and grain shape. Taste offers a more positive perspective for the local rice capacity to compete with imported rice. It was mentioned as one of the criteria by a third of the local rice consumers in the survey which means that there is still a category of consumers that consider local rice as a product with specific attributes that cannot be found in imported rice. It was suggested that with a better management and handling of the product appearance and cleanliness along the marketing chain, the demand for local rice could increase significantly. This overall review of customers' preferences indicates that the major factors behind the preference for imported rice in spite of higher prices are more related to post-harvest management operations along rice marketing chain than to the physico-chemical properties of the imported rice.

Erenstein *et al.* (2003) argued that locally produced rice has the potential to meet food (especially rice) demand of consumers in Nigeria if efficient production practices are employed. Oryza (2005) noted that urban consumers prefer and can afford to pay for high quality imported rice in contrast to local rice brands which are considered to be of poor quality because they often contain dirt, stones, chaff and large quantity of broken or irregular grains and so lack competitive advantage against the imported rice brand. Rice consumers in Nigeria appear to display a distinct preference for imported rice over domestic rice, which has led to a market price premium for imported rice. According to Ezedinma *et al.*, (2006), consumers in urban Nigeria have developed a tremendous taste for good quality rice and they will continue to measure the quality and competitiveness of domestic rice by the current standard and quality found in imported rice.

2.8.1 Marketing of domestic rice in Nigeria

Marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchange and satisfy individual and organizational objectives (AMA, 2013). Ihene (1996) defined rice marketing as the performance of all business activities in the flow of paddy and milled rice, from the point of initial production until they are in the hands of the ultimate consumers at the right time, in the right place and at a profit margin. Although the majority of the rice producers in Nigeria are smallholder farmers, most of them are into rice production because rice is a commercial crop, given the increasingly high demand for rice in the country. Marketing of locally produced rice takes place at four levels. First is the sales of rice paddy by farmers at farm gate immediately after harvest. Rice paddy are purchased from farmers at farm gate by itinerant

traders, processing companies and cooperatives at a give-away price that hardly covers the cost of production. The second level of rice marketing involves a wholesale trading of milled rice at village markets or rice milling centres. This takes place after primary processing of rice paddy (parboiling and milling). The third level consists of moving the milled rice to urban markets, while the fourth level encompasses mainly retailing in urban areas (FGD, 2012).

Importation of rice into the country creates a sort of competition between locally produced rice and imported rice. However, the locally produced rice is reputed for its peculiar taste and smell compared to imported polished rice. Market structure refers to those characteristics of the market organization that are likely to affect the behaviour and performance of firms such as the number of sellers, the extent of knowledge about each other's action, the degree of freedom of entry and the degree of product differentiation (Lipsey and Steiner, 1981). Although local rice marketing cannot be said to be perfect or purely competitive in the strict sense of the word, rice market structure in Nigeria can be described as atomistic competition.

2.9 The theory of consumer behaviour

Loudon and Bitta (1993) define consumer behaviour as the decision process and physical activity individuals engage in when evaluating, acquiring, using, or disposing of goods and services. Consumer purchase decisions appear to be based on a combination of economic and sociological factors and they could therefore be better understood if the concepts of the two disciplines are combined for the purposes of analysis. Consumers around the world vary tremendously in age, income, educational level and taste, among other factors and therefore buy an incredible variety of goods and services to satisfy their needs (Gary and Kotler, 2000).

According to Kinsey (1998), because majority of people in developing countries have low disposable incomes and because conditions of supply and demand are very different, it is assumed that physiological needs (e.g. food and water) are predominant in developing countries. She however pointed out that this may not always be the case because of people's self-concept and the cultural values and beliefs individuals subscribe to. Walter (1974) asserted that the poorer the economic outlook, the more important the small luxury of a flavoured soft drink or perfumed soap. He emphasized that to the dismay of the would-be benefactor, the poorer the malnourished are, the more likely they are to spend a disproportionate amount of whatever they have on some luxury rather than on what they so desperately need (i.e. physiological needs). The implication is that even though poorer people

are supposed to spend more money on their physiological needs, certain cultural and economic factors can compel them to purchase some luxuries they may not desperately need. Thus, consumer behaviour can sometimes be too complex to be predicted.

The household's consumption function gives the maximum amount of commodities consumed as a function of product price, income and some qualitative socio-cultural factors (Varian, 1990). Actual consumer behaviour is multidimensional and very complex. When a consumer goes shopping, his concern is not limited to how much of one good to buy; rather he must decide which of many available goods to buy at their respective prices. Thus, the presence of different rice varieties on the market and the differences in preferences among household members complicates rice consumption decisions of the household. In all cases, the consumer wants to get maximum satisfaction from his available income. According to Schiller (1997), the economic explanation for consumer choice builds on the theory of marginal utility and the law of demand.

Another postulate of consumer-choice theory takes into account the market prices of goods that are desired by consumers. Thus, rational behaviour requires one to compare the anticipated utility of each expenditure with cost and to choose those products that promise to provide the most pleasure for the amount of income available. Varian (1990) argues that the key to utility maximization is not simply buying what one likes best; instead, one must compare goods on the basis of their marginal utility and price. To maximize utility, the consumer should choose that good which delivers the most marginal utility. Optimal consumption refers to the mix of products that maximizes total utility for the limited amount of income one has to spend. The basic approach to utility maximization is to purchase the next rice variety that delivers the most marginal utility. Varian (1990) concludes that all goods included in the optimal consumption mix yield the same marginal utility. From the first order condition for utility maximization, the utility-maximizing rule is to satisfy the condition where the marginal utility derived from a product is the same as that derived from consuming another product in the consumption basket of the consumer. In other words, money spent on a product must yield the same marginal utility as that obtained when the same amount is spent on another product. This condition gives the greatest satisfaction from the limited income of the consumer.

2.9.1 Factors influencing consumer's behaviour

There are many factors influencing consumers' decision-making process. These factors are classified and structured in various ways in the literature. For example, Brown (2006) divides these factors into inner and outer factors distinguishing three basic categories: personal, psychological and social factors to which Kotler (2002) adds the cultural factors as the independent category. The next group of factors can be labelled as situational/peculiar factors; it means factors forming the environment of the concrete decision-making situation. Because the subject of the analysed inquiry are factors belonging to groups of personal, psychological and situation factors, in the hereafter text the attention is devoted only to them.

i). Personal factors: These are factors unique for each consumer. Above all, data such as age, sex, and place of residence, occupational and economic conditions, personality and self – consciousness can be found here (Horská and Sparke, 2007).

ii) Psychological factors: These include motivation, perception, skills and knowledge, positions, personality, style of life (Brown 2006). Perception means the adaption of reality. It is the process of selection, processing and interpretation of input data from the environment to make them purposeful (Brown 2006). Personality is created by inner characteristics and by behaviour. This makes a person unique. Personal characteristics influence the way how people behave. It is, however, difficult to find a reliable connection between the individual personality and the behaviour type.

Consumers' skills and knowledge are connected to learning and pre-destinate changes of behaviour. Therefore, to cause changes of consumer behaviour concerning the concrete product, it is necessary to give the adequate information. Learning process can come through a simple association between the impulse and the reaction to it, or through the complicated set of rational activities. Motive means the inner driving force that orients human/consumers' activities towards meeting the needs or achievement of the definite aim. In every decision-making process several motives play role, not only one. In case of need of measuring or analysing, there is one questionable thing that motives often work only on the subconscious level (Brown 2006). Knowledge and positive or negative feelings influence humans' perception and consequently decision making and behaviour. People learn their bearings through experience and interaction with other people. The eventual changes of positions are conditioned by consumers' personality and his style of life. Consumer generally refuses

information that is in conflict with his positions; eventually he modifies them to reach correspondence.

iii). Situational factors: These can notably influence purchase decision. Social and physical environment of the purchase place, time influences and the previous states fall into this group (Berkowitz et al. 1992).

2.10 The theory of consumer's demand

A consumer's demand gives the number of units of a particular product that the consumer would choose to buy at each possible price over a specified period of time (Ekelund and Ault, 1995). Given any available set of bundles of products, the consumer chooses that bundle which maximizes his utility or satisfaction. Thus, consumer's demand for a good is the quantity chosen as a result of this utility maximization, which is also dependent on precisely what sets of bundles of goods are available. According to Henderson and Quandt (1986), commodity prices and consumer income are the main determinants of the demand level for a commodity. McKenna and Rees (1992) also noted that prices, consumer income and preferences (i.e. tastes, habits, desires and drives) interact to determine the individual demand function. According to them, the "law of demand" is a fundamental economic principle, which indicates that a decrease in the price of a commodity results in an increase in the quantity of the commodity that buyers are willing and able to purchase in a given period of time, if other factors are held constant. Tambi (1995), in static and dynamic demand analysis, also found that income, own-price, prices of substitutes, and previous consumption are the important determinants of household beef consumption patterns in Cameroon.

Apart from product price, prices of substitutes and income, certain household and socio-cultural factors play very significant roles in shaping household consumption patterns. Household factors such as household size/number of dependants, age, gender and socio-cultural factors such as religion, tribal/ethnic affiliation, educational background, and occupation, among others, affect consumption pattern (Lipsev and Crystal, 1999). According to Gao and Spreen (1992), socioeconomic variables also have significant impacts on consumer's demand for commodities. In their analysis of consumer demand for meat products, it was shown that the most significant household characteristic variables include region of residence, ethnic background, household size, female household head, employment status and away-from-home food consumption.

2.10.1 Household characteristics in food demand estimation

Buyers' decisions are influenced by personal characteristics such as age, gender, and educational level (Gary and Kotler, 2000). Household factors like household size, number of dependants in the household, number of household members in full time employment, number of women in the household and their employment status also influence household consumption patterns.

Age

Consumption decisions are shaped by the age of the consumer. Gary and Kotler (2000) asserted that marketers often define their target markets in terms of lifecycle stage and develop appropriate products and marketing plans for each age group. Jerome and Perreault (1991) also noted that young people spend more on basic necessities than the aged who spend a lot more on durable consumer goods. Empirical work shows that age influences consumption demand in a nonlinear fashion (Blisard et al., 2003). According to these authors, the inclusion of the age variable in household consumption models could be justified on the grounds that it may capture changes in purchase behaviour due to the changes in the consumer's biogenic and psychogenic needs over the life cycle.

Blisard (2001) expanded aggregate lifecycle expenditure analysis by separating generational or cohort effects from aging effects. This is important since different generations or age groups may exhibit expenditure patterns that are the result of higher incomes and/or different tastes and preferences. Ignoring these generational effects produce income and consumption age profiles that can be misleading. With accurate consumption and age profiles, policymakers can gain a better idea of food intake patterns by cohort, and thereby identify groups that may need additional diet and health information. Using survey data to follow eight cohort groups from 1982 through 1995, Blisard (2001) found that all food categories (except for vegetables and sugar & sweets) have statistically significant cohort effects; younger cohorts spend less than older cohorts on food at home, meat, poultry, fish, eggs, and dairy products, but more on cereal and bakery goods because of higher energy demand resulting from higher level of activity. A recent study set out to determine the extent to which food consumption patterns in childhood change in young adulthood showed that at age ten, the percentage of children consuming vegetables, breads/grains, poultry, mixed meats, desserts, fruit/fruit juice, candy and milk was significantly higher than the percentage consuming those food groups in young adulthood. There was higher percentage of young

adults consuming cheese, more sweetened beverages and seafood than they did in childhood (Frost and Sullivan, 2004). These empirical findings notwithstanding, for yam products, one does not expect a total shift to or from the commodity with increasing age since it is a major staple food commodity in Ghana. However, the study attempted to disaggregate the data according to age profile to examine how age differences influenced yam consumption patterns in urban communities.

Gender

Gender of the consumer influences purchasing decisions, hence consumption expenditure on goods and services. Evans (1998) noted that males and females have different purchasing and spending patterns due to differences in their needs and wants. It was noted that whereas males are normally concerned about capital expenditures as well as away-from-home food expenditures, females are mostly interested in the purchase of clothing, cosmetics, and most importantly food for the home, among other things.

Adebayo (2004) noted that studies which investigate the effect of variation in household resource control pattern on consumption in developing countries are not common, due to lack of gender disaggregated household level information on income, expenditure and consumption. Hopkins *et. al.*, (1994), found that in Niger, changes in female annual income, while controlling for male income, impacted positively (though marginal) on household food expenditures. These results, hold for both earned and unearned income (e.g. remittances and gifts). Hoddinott and Haddad (1995), found a positive but small marginal effect of women's income share on household food budget share. It was noted in Ivory Coast that household cash income received by wives would lead to a 1.9% rise in budget share of food eating within the household. Thomas (1997), on the other hand, found that the marginal effect of increasing women's income on food expenditure share was negative for Brazilian households. He, however, concluded that household food calorie and protein intake respond more positively to increases in women's income than increases in husband's income. This apparent paradox could suggest that males in Brazil spend more on food commodities like fruits, vegetables, and food-away-from home whereas females spend more on carbohydrate and protein sources. The study concluded that the identity of the household member controlling income affects calorie and protein intake and hence height-for-age and weight-for height of children. Generally, the observed impact of women's income share on household consumption patterns is thought to be a reflection of gender differentiated preferences.

Education level of the household

The effects of education are widely researched in many advanced societies. However, classical works of the effects of education have tended to focus on the analysis of the financial returns to education. The measurements of increased wage compensation and increased total income are often strikingly conclusive (Bobby, 2004). The level of education is likely to affect the consumption patterns of households. The level of formal education is likely to be highly influential in either promoting traditional attitudes or introducing new attitudes towards product (Jerome and Perreault, 1991). The higher the level of formal education and the more widely available it is, the more it will be an agent of change in the definition of wants and needs. As people become more conscious that a better standard of living is possible, new needs develop as old ones become satisfied (Kinsey, 1998).

In a study to examine the effect of educational level on consumption in South Africa by Bobby (2004), it was revealed that an increase in educational level yielded an increase in percent per capita expenditure for all expenditure categories investigated. The largest percentage increase was related to risk aversion expenditure (e.g. savings and insurance expenditures), while per capita food expenditure experienced the smallest magnitude effect. The regression analysis, while controlling for race, residence location, and per capita income, indicated a 1.7% increase in per capita expenditure for an increase in the educational level of a household. It was noted that these results might be a function of the nature of the goods being investigated. Savings and insurance expenditures usually involve discretionary spending, while food expenditure is essential to every household. Therefore, these results may suggest that increased education has more of an effect on non-essential goods expenditure in households than it has on essential goods.

Household size

A household can be defined as a group of people (or a social unit) who live together and eat from the same pot. The worldwide web defines a household to include all the persons who occupy a housing unit together with common housekeeping, sharing at least one meal a day, and occupying a common living or sitting room (www.eia.doe.gov/nei/datadefinition/; Accessed in May, 2017). Household size has relevant implications for household purchasing and spending behaviour (Jerome and Perreault, 1991). Households with large family sizes spend more on consumer goods than households with small family sizes, *ceteris paribus*.

Evans (1992) emphasized that an understanding of household dynamics is important in consumer marketing as the household is the basic unit of consumption.

Even though the study by Gale *et al.*, (2005) found food to be the largest single expenditure item for rural Chinese people. Larger households were found to spend more on non-food items. The presence of school-age children was associated with larger cash expenditures on education and less on food. Larger family size was therefore found to be associated with greater budget shares devoted to housing and education and less devoted to at-home food and other non-food expenditures. According to Sdrali (2006), Cage (1989) and Kalwij *et al.* (1998), household size was found to be a significant and positive factor in food expenditure. These studies found food expenditure to be positively related to increases in the number of household members. The change in food expenditure increases at a decreasing rate as household size increases and becomes negative when household size becomes large.

Lazear and Michael (1980) estimate that the expenditures of two adults living together are 31-35% lower than a single-adult household using the United States Consumer Expenditure Survey (CES), with the largest savings on food and shelter expenditure and smaller savings on personal care. Deaton and Paxson (1998) present evidence of economies of scale in food consumption from a number of developed and developing countries. The observed economies of scale in food expenditures are particularly interesting and somewhat puzzling. Food itself is a private good which cannot be shared, but there is likely to be a substantial public component in preparing meals. Vernon (2004) asserted that models that do not include time costs predict that at a constant per capita expenditure, larger households save on public goods like housing and increase per-person expenditures on private goods like food. She, however, noted again that empirical evidence shows the opposite for both modern households and those observed a century ago by Engel (that per capita food expenditures fall as households grow). This seeming paradox was introduced by Deaton and Muellbauer (1980a) and extended by Deaton and Paxson (1998). Several subsequent studies have attempted to resolve it in a variety of ways. Gibson (2002) suggests that large estimates of economies in size may be due to a measurement error in recall expenditure data. Gan and Vernon (2003) show that food expenditures increase relative to another more sharable good and decrease relatively to a less sharable good, and therefore, the paradox disappears when subsets of expenditures are examined. Using household expenditure survey data from Russia, Vernon (2004) estimated the effect of changing household size on food expenditures and found out that doubling the size of a household causes the household to reduce per capita food expenditure by over 30%.

2.10.2 Occupation and away-from-home food consumption

Consumer's occupation also affects purchasing and consumption decision. Seyoum (1988) reports that results from consumer surveys in 1979 and 1981/82 in Cote d'Ivoire and Nigeria respectively indicated that clerks and wage earners are major consumers of milk products. Gary and Kotler (2000), in recognition of the effect of occupation on consumption, suggested that marketers should try to identify the occupational groups that have an above-average interest in their products and target them as separate market niches.

Collaborative survey work by IFPRI and the University of Ouagadougou revealed that urban rice consumption is especially sensitive to work patterns in the urban household. As women enter the work force, and men work away from home, there is strong demand for staples that can be prepared quickly at low cost and that are available in roadside restaurants. Since rice meets both needs, urbanization appears to dominate price factors in explaining the shift toward rice (Delgado and Reardon, 2000). As household members eat away from home, the total at-home food consumption will decrease. Food consumed away-from-home is one of the fastest growing categories of rural household expenditures in China, doubling in budget share from 1995 to 2001 (Gale *et al.*, 2005). It was noted in their study that food away-from home stands out as the one food expenditure item that is taking a larger share of household budgets as expenditure rises. In 1995, just 3.2% of rural food spending was on food-away-from-home, but this share more than tripled to 11.2% in 2003.

2.10.3 Cultural factors (ethnic and religious affiliation)

Culture refers to the values, ideas, attitudes and symbols that people adopt to communicate, interpret, and interact as members of a society. Kinsey (1998) described culture as one of the most significant factors that may be used to explain differences in consumer behaviour. She stressed that whilst basic needs are the same the world over, the drives to satisfy them are affected by the compulsion, checks and guidance systems, which originate from culture. Thus cultural overlay forms the foundation for all motivational differences between consumer groups. Gary and Kotler (2000) also stated that cultural factors exert the broadest and deepest influence on consumer behaviour. From the viewpoint of Bearden *et al.*, (1995), the concept of culture has two primary implications for marketing; it determines the most basic values that influence consumer behaviour patterns, and it can be used to distinguish subcultures that represent substantial market segments and opportunities. The ways in which

culture directly affects needs and wants may be understood with reference to the major aspects of culture: ethnic and religious affiliations.

Ethnic groups may be formed around national, racial or geographical factors. Members of an ethnic group or tribe share similar values and patterns of behaviour, which make them attractive market targets for specific products or brands. Particular tribes may have certain beliefs about specific food products and this influences their decision to consume such foods or otherwise.

Food is an important part of religious observance and spiritual ritual for many different faiths, including Christianity, Judaism, Islam, Hinduism and Buddhism. The role of food in cultural practices and religious beliefs is complex and varies among individuals and communities. Religion, being the mainspring of culture, affects the type of products consumed by a certain group of people based on their belief and value systems. Because some products have traditional importance in many countries, religion might affect the consumption pattern of such products if taken to its logical conclusion. However, Kinsey (1998) contended that in reality, rarely are religious ideals taken to their ultimate conclusions. Also, there has been much watering down of traditional and religious beliefs through the introduction of new values and products from other cultures. Nevertheless, Kinsey (1998) maintained that tribal and religious affiliations still affect tradition, superstition, taboos and perceptions and may help explain otherwise inexplicable consumer attitudes which determine how needs are fulfilled.

Heiman *et al.*, (2004) used data from Israel to analyze food consumption and showed that beliefs, lifestyle and ability to cook affect food consumption patterns. The intensity of belief was especially important and more devout followers of certain religions were seen to present unique market opportunities. They asserted that food purchases are largely affected by religious lifestyle and cultural factors, in addition to prices and income. This is because patterns of behaviour vary among followers of different religions, resulting from different norms. Religious intensity affects attitudes towards food modifications. The intensity of religious beliefs was the most dominant explanatory variable when consumers were presented with the hypothetical choices between chicken fortified with hormones versus the same fortification through genetic modification, and between beef coloured through chemical dye versus genetic modification. While overall, 70 percent of the population preferred the genetic modification; the largest opposition came from the orthodox religious groups, from which 40

percent preferred the chemical treatment. Among the conservatives, 20 percent preferred the chemical treatment, while among the secular, only 10 percent preferred the chemical treatment (Heiman et al, 2004).

2.11 Consumers' Perception

In biology, perception refers to the senses that any organism uses to collect information about its environment. The senses corresponding to the human sense organs have been categorized at least since Aristotles time as: vision (our eyes), hearing (our ears), taste (our tongues), touch (our skin) and smell (our noses). Our sense of smell and taste are our olfactory senses due to the fact that our senses of smell and taste are so closely entwined and that humans also perceive in a kin-aesthetic mode, (using muscles and joints) and in a vestibular mode (through our internal organs) (Alba and Wesley, 2009).

In consumer behaviour, however, perception refers to much more than just the biological use of our sense organs. It includes the way stimuli are interacted and integrated by the consumer. Although there are numerous definitions in literature explaining perception from a consumer behaviour perspective, the one used by Brunswick (2009), defined it as “The entire process by which an individual becomes aware of the environment and interprets it so that it will fit into his or her frame of reference” and this definition provides particular clarity on the topic. He further expanded the definition by stating that every perception involves a person who interprets through the senses something, event, or relation which may be designated as the percept. Alba and Wesley (2009) added that perception occurs when sensory receptors receive stimuli via the brain, code and categorize them and assign certain meanings to them, depending on the person’s frame of reference. A person’s frame of reference consists of all his previously held experiences, beliefs, likes, dislikes, prejudices, feelings and other psychological reactions of unknown origin.

From the discussion, it is eminent that the perception process has long been recognized as the most significant barrier to effective communication. It is at this point that the sender does or does not get through to the receiver, since correct decoding of marketing information hinges on the consumer’s perception of the communication content (Aaker and Gary, 2008). A problem though with perception and related studies is that two individuals may be subjected to the same stimuli under apparently the same conditions, but how they recognize, select, organize and interpret them is an individual process based on each person’s own needs,

values, expectations and the like. Individuals, furthermore, act and react on the basis of their perceptions, not on the basis of objective reality.

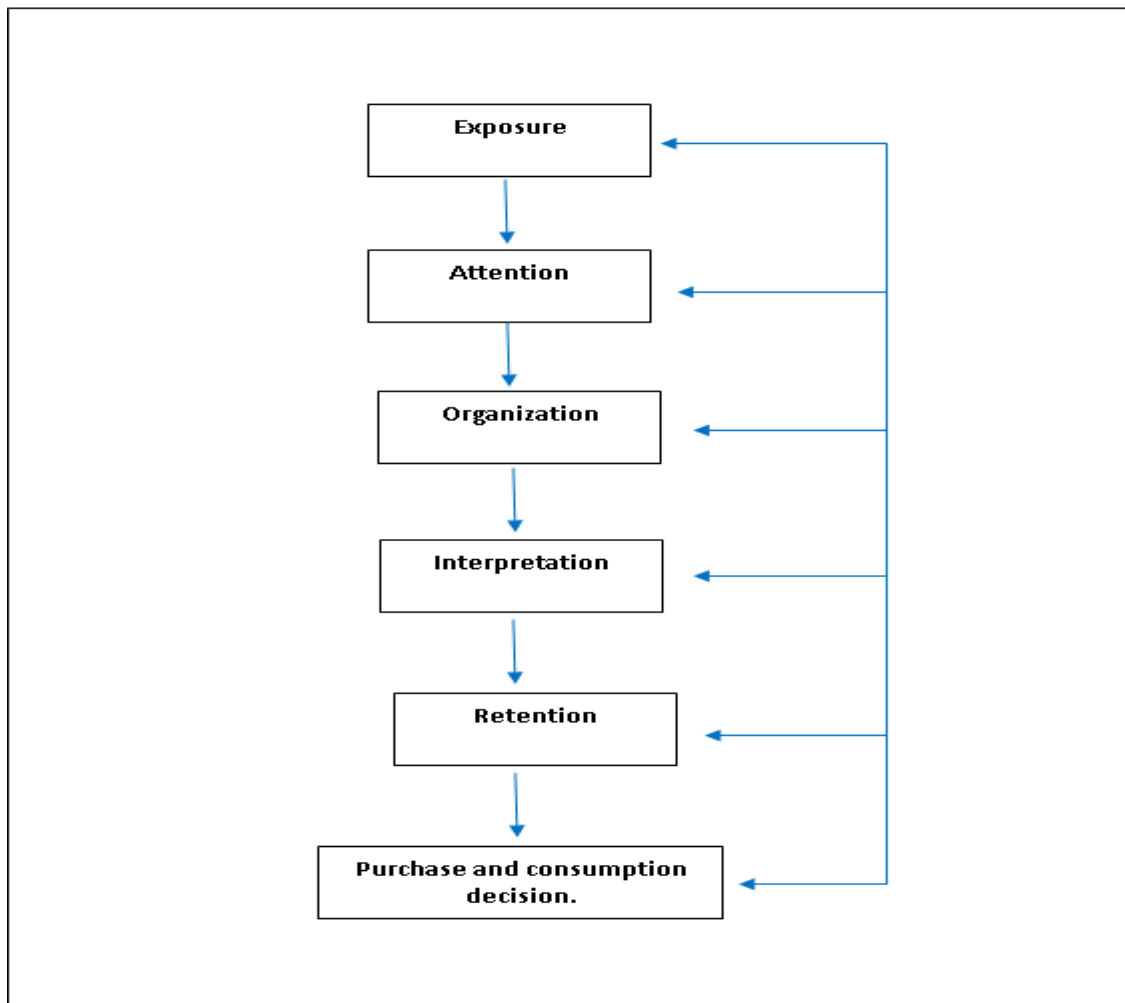


Figure 2.1: The Consumers' Perception Process Model

Source: Adapted from Hawkins (2007).

2.11.1 The Consumers' Perception Process

The perception process as displayed in the figure above consists of five distinct activities. The first activity is that of exposure to stimuli. The second states suggests that attention to stimuli has to occur. During the third activity (organization), people organize stimuli so that it can be comprehended and retained. The fourth activity is that of interpretation of the message. Information is retained during the last activity. As seen in figure above, a successful perception process leads to a purchasing and consumption decision (Hawkins, 2007).

1. Exposure

Exposure, the first step of the perception process, occurs when a stimulus comes within the range of our sensory receptor nerves, i.e. when stimuli come within the range of one of our senses. Exposure is therefore simply the minimum requirement of perception. No matter how great a message is, it will not be perceived unless a person is exposed to the stimulus (Hawkins, 2007). Dickson and Alan (2009), explain that exposure to stimuli is of either an intentional or an accidental nature. Intentional exposure occurs when an individual is exposed to market- related information because of his own intentional, goal-directed behaviour, i.e. it reflects a person's interests, reading habits, information needs and life style. Accidental exposure to stimuli occurs when the individual is exposed to intensive marketing campaigns, such as the messages portrayed by the broadcasting media, billboards, point-of-sale displays in the retail store and the vast number of magazine and newspaper advertisements. Furthermore, the individual is also accidentally exposed to information such as testimonies from friends or relatives concerning a specific product. Such testimonies first leads to interest, and then to intentional exposure. There can be no communication (or a perception process for that matter) without exposure (Hawkins, 2007).

2. Attention

According to Brunswick (2009), an individual is exposed, whether intentionally or accidentally, to thousands of different marketing stimuli during a normal living day ranging from thousands of different products in a retail store, all differing in packaging, colour and design to as many as 1,500 advertisements. From a marketing perspective, attention is of crucial importance, since no matter how often a consumer is exposed to marketing stimuli, if no attention took place, the message is of no use. Attention to a given stimulus has taken place only if a consumer notices or attends to the stimulus. If a consumer does not focus on a stimulus, e.g. an advertisement, although he has been exposed to it, attention did not take place. The attention process can therefore be viewed as an information filter - a screening mechanism that controls the quantity and nature of information any individual receives (Aaker and Gary, 2008). They state further that, before attending to the factors determining attention, it is important to note that the so- called attention filter operates at three different levels of effort and consciousness that vary from active search to passive attention.

3. Perceptual Organization

Assael (2009), defined perceptual organization as: “The organization of disparate information so that it can be comprehended and retained.” He explained that people do not experience the numerous stimuli they select from the environment as separate and discrete sensations. They rather tend to organize them into groups and perceive them as unified wholes. The perceived characteristics of even the simplest stimulus are therefore viewed as a function of the whole to which the stimulus appears to belong. Dickson and Alan (2009), support this viewpoint by adding that during the perceptual organization process, consumers’ group information from various sources into a meaningful whole to better comprehend such information and act on it. Aaker and Gary (2008), explain perceptual organization by stating that because stimuli are perceived not as a set of elements but as a whole, it can be concluded that this total has a meaning of its own that is not necessarily deductible from its individual components. This phenomenon is termed the gestalt psychology.

Assael (2009), claim that the basic hypothesis of the gestalt psychologists is that people organize perceptions to form a complete picture of an object. Mowen (2003), supports this view by stating that the gestalt psychologists attempted to identify the rules that govern how people take disjoint stimuli and make sense out of the shapes and forms to which they are exposed. Aaker and Gary (2008), suggest that even when stimuli are incomplete, people strive to form a complete impression of a person or object. The reason for this statement is that an individual has a cognitive drive towards an orderly cognitive configuration or psychological field. An individual desires to make the field as good as possible. Dickson and Alan (2009), conclude by stressing the fact that an important tenet of the gestalt psychology is that there is a cognitive drive to obtain what they term a “good gestalt, i.e. people desire to have perceptions that are simple, familiar, regular, complete, meaningful and consistent.

4. Perceptual Interpretation

According to Mowen (2003), interpretation can be defined as a process whereby people draw upon their experience, memory, and expectations to interpret and attach meaning to a stimulus. Brunswick (2009), explained that the interpretation phase is uniquely individual, since it is based upon what individuals expect to see in the light of their previous experience, on the number of plausible explanations they can envision, and on their interests and motives at the time perception occurs. Mowen (2003), added to this by stating that during this phase, people will retrieve from long-term memory information pertinent to the stimulus.

Expectancies regarding what the stimulus “should be like” are also retrieved from memory and used to interpret the stimulus. He then pointed out a problem with interpretation, that individuals may interpret the same stimulus differently. He concluded that personal inclinations, bias, and most important of all, expectations of the individual, will influence his interpretation of a stimulus.

5. Retention

Retention is defined as the actual storage of processed information in the memory of the individual. Van (1991), explained that even if the total perception process was successful, it serves no purpose if the individual is unable to recall the information when he is required to act on it. The message has failed if a person cannot remember its content. Hawkins (2007), expanded the explanation by stating that memory plays a critical role in guiding the perception process. Memory has a long-term storage component and a short-term active component. Brunswick (2009), added to the discussion by explaining that, since short-term memory is the active component, it deals with problem-solving by using newly acquired information. This, however, can only be true if no knowledge about a certain subject exists, and that is rarely the case. Long-term memory is activated to help solve the problem by supplying relevant past stored information. Long-term memory is once again activated to retain the information once the processing has been completed, and this will remain dormant for future reference purposes.

2.11.2 Consumer Perception of Quality.

Though consumer perceptions of price, quality, and value are considered pivotal determinants of shopping behaviour and product choice, research on these concepts and their linkages has provided few conclusive findings. Research efforts have been criticized for inadequate definition and conceptualization, inconsistent measurement procedures and methodological problems. One fundamental problem limiting work in the area involves the meaning of the concepts: quality and value are indistinct and elusive constructs that often are mistaken for imprecise nouns like “goodness, or luxury, or shininess, or weight”. Quality and value are not well differentiated from each other and from similar constructs such as perceived worth and utility (Zeithaml, 2010).

2.11.3 The Concept of Perceived Quality

Quality can be defined broadly as superiority or excellence. By extension, perceived quality can be defined as the consumer's judgment about a product's overall excellence or superiority. Perceived quality is (i) different from objective or actual quality, (ii) a higher level abstraction rather than a specific attribute of a product, (iii) a global assessment that in some cases resembles attitude, and (iv) a judgment usually made within a consumer's evoked set (Zeithaml, 2010).

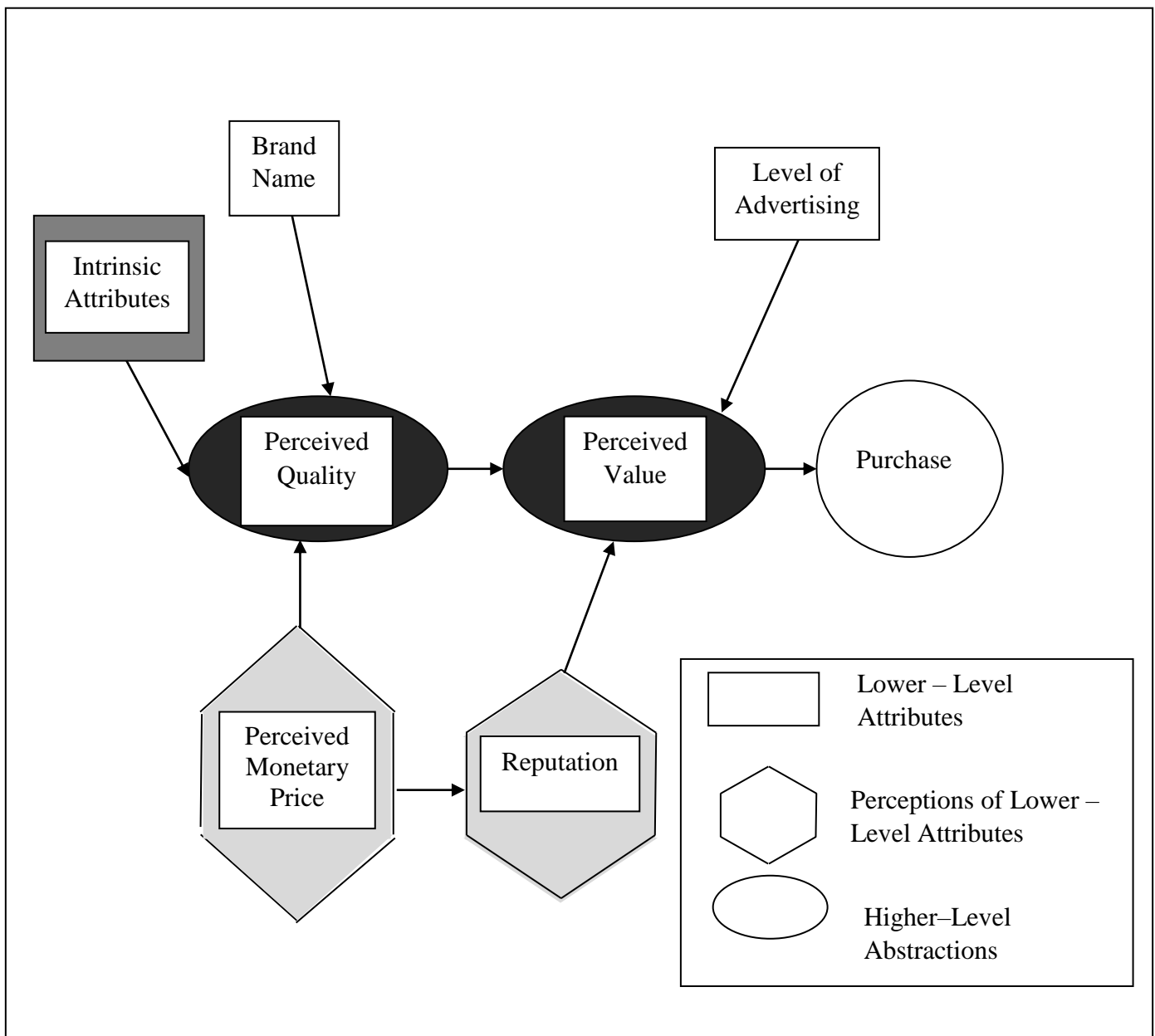


Figure 2.2: A Means-End Model Relating Price, Quality, and Value
Source: Zeithaml, V.A (2010).

i. Objective quality versus perceived quality: Several researchers have emphasized the difference between objective and perceived qualities. Zeithaml, (2010) for example, distinguished between mechanistic and humanistic qualities: “mechanistic [quality] involves an objective aspect or feature of a thing or event; humanistic (quality) involves the subjective response of people to objects and is therefore a highly relativistic phenomenon that differs between judges”. As it has been used in the literature, the term “objective quality” refers to measurable and verifiable superiority on some predetermined ideal standard or standards. Published quality ratings from sources such as Consumer Reports are used to operationalize the construct of objective quality in research studies (Bonner and Nelson, 2010).

The term “objective quality” is related closely to, but not the same as other concepts used to describe technical superiority of a product. For example, Garvin (2003), discussed product-based quality and manufacturing-based quality. Product-based quality refers to amount of specific attributes or ingredients of a product. Manufacturing-based quality involves conformance to manufacturing specifications or service standards. In the prevailing Japanese philosophy, quality means zero defects doing it right the first time. Conformance to requirements and incidence of internal and external failures are other definitions that illustrate manufacturing-oriented notions of quality.

According to Zeithaml (2010), these concepts are not identical to objective quality because they, too, are based on perceptions. Though measures of specifications may be actual (rather than perceptual), the specifications themselves are set on the basis of what managers perceive to be important. Managers’ views may differ considerably from consumers’ or users’ views. Consumer reports ratings may not agree with managers’ assessments in terms of either salient attributes or weights assigned to the attributes.

In a research study on products of Cardbury Nigeria Plc, Ogundugbe (2011) pointed out striking differences between consumers’, dealers’ and managers’ perception of products quality. When asked how consumers perceive quality, managers listed product design, performance, and forms as critical components. Consumers actually keyed in on different components: package, taste, and richness in nutrients. To reiterate, perceived quality is defined in the model as the consumer’s judgment about the superiority or excellence of a product. This perspectives similar to the user-based approach of Garvin (2003) and differs from product-based and manufacturing-based approaches. Perceived quality is also different

from objective quality, which arguably may not exist because all quality is perceived by someone, be it consumers or managers or researchers.

ii. Higher level abstraction rather than an attribute: The means-end chain approach to understanding the cognitive structure of consumers holds that product information is retained in memory at several levels of abstraction. The simplest level is a product attribute; the most complex level is the value or payoff of the product to the consumer (Zeithaml, 2010). Young and Feigen (2005), depicted this view in the “Grey benefit chain,” which illustrates how a product is linked through a chain of benefits to concept called the “emotional payoff.”

Product → Functional Benefit → Practical Benefit → Emotional Payoff

Figure 2.3: Benefit chain

Source: Author, 2019

Related conceptualizations pose the same essential idea: consumers organize information at various levels of abstraction ranging from simple product attributes (e.g., physical characteristics) to complex personal values. Quality has been included in multi-attribute model as though it were a lower level attribute. Criticisms of this practice have been levelled by Ahtola, (2004), but perceived quality is instead a second-order phenomenon.

iii. Global assessment similar to attitude: Garvin (2005), viewed quality as a form of overall evaluation of a product, similar in some ways to attitude. Young and Feigen (2005), concurred, suggesting that quality is a relatively global value judgment. Lutz (2006), proposed two forms of quality: “affective quality” and “cognitive quality.” Affective quality parallels Garvin’s views of perceived quality as overall attitude. Cognitive quality is the case of a super-ordinate inferential assessment of quality intervening between lower order cues and an eventual overall product evaluation (Lutz 2006). In Lutz’s view, the higher the proportion of attributes that can be assessed before purchase (search attributes) to those that can be assessed only during consumption (experience attributes), the more likely it is that quality is a higher level cognitive judgment. Conversely, as the proportion of experience attributes increases, quality tends to be an affective judgment. Lutz extends this line of reasoning to propose that affective quality is relatively more likely for services and consumer non-durable goods (where experience attributes dominate), whereas cognitive quality is more likely for industrial products and consumer durable goods (where search attributes dominate).

iv. Judgment made within consumer’s evoked set: Evaluations of quality takes place in a comparison context. Zeithaml (2010), claimed that quality evaluations are made within “the

set of goods which would in the consumer's judgment serve the same general purpose for some maximum outlay". On the basis of the qualitative study, and consistent with Zeithaml's contention, the set of products used in comparing quality appears to be the consumer's evoked set. A product's quality is evaluated as high or low depending on its relative excellence or superiority among products or services that are viewed as substitutes by the consumer. It is critical to note that the specific set of products used for comparison depends on the consumer's, not the firm's, assessment of competing products. For example, in beverages, consumers can compare the quality of different brands of orange juice (which would be the comparison context of the firm), the quality of different forms (refrigerated vs. canned), and the quality of purchased versus homemade orange juice. Also in products like bournvita, milo and hollandia milk, the quality and value attributes would include flavour, colour, nutrients, texture, and degree of sweetness. In raw food like yam, the quality and value could be perceived on the basis of sources e.g. Benue yam, Anam yam (Anambra State) or Abavo yam (Delta State) (Okoh, 2010).

Generalizing about quality across products has been difficult for managers and researchers. Specific or concrete intrinsic attributes differ widely across products, as do the attributes consumers use to infer quality. Obviously, attributes that signal quality in fruit juice are not the same as those indicating quality in washing machines or automobiles. Even within a product category, specific attributes may provide different signals about quality. For example, thickness is related to high quality in tomato-based juices but not in fruit-flavoured children's drinks. The presence of pulp suggests high quality in orange juice but low quality in apple juice (Bruks and Zeithaml, 2010).

Though the concrete attributes that signal quality differ across products, higher level abstract dimensions of quality can be generalized to categories of products. As attributes become more abstract (i.e. are higher in the means-end chains), they become common to more alternatives. Garvin (2003), for example, proposes that product quality can be captured in eight dimensions: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality (i.e., image). Similarly, Bonner and Nelson (2010), proposed that the multitude of specific variables affecting a firm in the environment can be captured in abstract dimensions. Rather than itemizing specific variables that affect particular firms in different industries under varying circumstances, they proposed conceptualizing the environment in terms of its abstract qualities or dimensions (e.g., homogeneity-heterogeneity, stability-instability, concentration-dispersion, and turbulence).

Bonner and Nelson (2010), found that sensory signals such as rich/full flavour, natural taste, fresh taste, good aroma, and appetizing looks all higher level abstract dimensions of perceived quality were relevant across 33 food product categories. Brucks and Zeithaml (2010), contend on the basis of exploratory work that six abstract dimensions (ease of use, functionality, performance, durability, serviceability, and prestige) can be generalized across categories of durable goods. Though empirical research has not verified the generalization of dimensions for categories of packaged goods other than food products, for durable goods, or for industrial goods, abstract dimensions spanning these categories could be conceptualized, verified, and then used to develop general measures of quality in product categories.

According to Schmalensee (2008), extrinsic attributes (e.g. price, brand name) are not product specific and can serve as general indicators of quality across all types of products. Price, brand name, and level of advertising are three extrinsic cues frequently associated with quality in research, yet many other extrinsic cues are useful to consumers. Of special note are extrinsic cues such as product warranties and seals of approval (e.g Good Housekeeping). Price, the extrinsic cue receiving the most research attention, appears to function as a surrogate for quality when the consumer has inadequate information about intrinsic attributes. Similarly, brand name serves as a “shorthand” for quality by providing consumers with a bundle of information about the product. Level of advertising has been related to product quality. The basic argument holds that for goods whose attributes are determined largely during use (experience goods), higher levels of advertising signal higher quality. Schmalensee, (2008), argues that level of advertising, rather than actual claims made, informs consumers that the company believes the goods are worth advertising (i.e of high quality).

Supporting this argument is the finding that many subjects in the exploratory study perceived heavily advertised brands to be generally higher in quality than brands with less advertising. The exploratory investigation of beverages by Zeithaml (2010), provide evidence that form of the product (e.g., frozen vs. canned vs. refrigerated) is an additional important extrinsic cue in beverages. Consumers held consistent perceptions of the relative quality of different forms of fruit juice: quality perceptions were highest for fresh products, next highest for refrigerated products, then bottled, frozen, canned, and lowest for dry product forms.

Consumers depend on intrinsic attributes more than extrinsic attributes. Which type of cue, intrinsic or extrinsic, is more important in signalling quality to the consumer? An answer to this question would help firms decide whether to invest resources in product improvements

(intrinsic cues) or in marketing (extrinsic cues) to improve perceptions of quality. Finding a simple and definitive answer to this question is unlikely, but an exploratory study suggests the type of attribute that dominates depending on several key contingencies (Schmalensee, 2008).

The first contingency relates to the point in the purchase decision and consumption process at which quality evaluation occurs. Consumers may evaluate quality at the point of purchase (buying a beverage) or at the point of consumption (drinking a beverage). The salience of intrinsic attributes at the point of purchase depends on whether they can be sensed and evaluated at that time that is whether they contain search attributes (Nelson, 2010). Where search attributes are present (e.g., sugar content of a fruit juice or colour or cloudiness of a drink in a glass jar), they may be important quality indicators. In their absence, consumers depend on extrinsic cues. Nelson states further that, at the point of consumption, most intrinsic attributes can be evaluated and therefore become accessible as quality indicators. Many consumers in the exploratory study on beverages used taste as the signal of quality at consumption. If a beverage did not taste fresh or tasted ‘tinny’ or too thin, the evaluation is that quality is low.

Consumers depend on intrinsic attributes when the cues have high predictive value. Many respondents in the exploratory study, especially those expressing concern for their children’s health and teeth, unequivocally stated that purity (100% juice, no sugar) was the criterion they used to judge quality across the board for fruit juice category. The link between quality and this intrinsic attribute was clear and strong: all fruit beverages with 100% juice were high quality beverages and all others were not (Zeithaml, 2010).

2.12 Household dietary knowledge

Dietary knowledge is very important in ensuring that the recommended intake of nutrients are met by individuals in the household. Proxy measures for measuring household dietary knowledge have been developed. These are Household Dietary Diversity Score (HDDS) and Food Consumption Score (FCS), which have both been validated in different countries (Wiesmann *et al.*, 2009; Rose, 2008). Household dietary knowledge determines to a great extent the number of individual food items or food groups consumed by members of the household (FAO, 2011). At the household level, dietary knowledge is not only indicative of diet quality but also reflects the economic ability of a household to access a variety of foods (FAO, 2011). The food consumption score uses information on both dietary knowledge and

food frequency (number of days the food is consumed per week) and applies a weighting system (WFP, 2007) and is also used in monitoring household economic access to food.

Arimond and Ruel, (2004) noted that a more diversified diet knowledge is reflective of dietary adequacy thus, individuals consuming a more diverse diet are thought to be more likely to meet their nutrient needs. A meta-analysis from ten poor and middle income countries investigating the association between household dietary knowledge and food security found that, one percent increase in dietary knowledge was associated with a one percent increase in per capita consumption, a 0.7 percent increase in total per capita caloric availability, a 0.5 percent increase in household per capita daily caloric availability from staples, and a 1.4 percent increase from non-staples. (Hoddinott and Yohannes, 2002). This is an indication that an increase in household dietary knowledge corresponds to increased caloric intake from foods which is needed to meet energy and nutrient needs.

Lack of knowledge, usually found in the developing countries where diets include mostly starchy staples, with few or no animal products may be high in fats and sugars (Carletto et al., 2013), this may relate to the problem of multiple nutrient deficiencies. For young children in the households, this may be problematic since they need energy and an array of essential nutrients from a diet for rapid mental and physical development (Arimond and Ruel, 2004).

2.12.1 Dietary knowledge construct

Dietary knowledge, broadly defined, refers to knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations (Axelson & Brinberg, 1992; McKinnon, *et al.*, 2014; Moorman, 1996; Parmenter & Wardle, 1999). Although some have argued that a narrower definition of dietary knowledge may be desirable (Axelson & Brinberg, 1992; Li, *et al.*, 2000), Parmenter and Wardle (1999) suggest that a broad definition of dietary knowledge is needed to capture the complex and wide-ranging nature of the information used to instruct dietary choice. For example, knowledge of the relationship between diet and cancer may enable consumers to focus on fiber information presented on the nutrition label and whole grains in the ingredient list. Knowledge of dietary recommendations may support applying these pieces of nutritional information to decide whether the food product represents a healthy choice within the context of other foods the individual consumes that day. Consistent with the cognitive literature, the various dimensions

of dietary knowledge may be connected in such a way that they support each other, as an integrated semantic network.

2.12.2 Empirical consideration of dietary knowledge on households' food consumption

Yen *et al.*, (2008), investigated the roles of dietary knowledge in the consumption of meat products at home and away from home. The study developed a simultaneous equations system to accommodate censored dependent variables and endogenous dietary knowledge. The result showed that dietary knowledge has effect on consumption by decreasing beef and pork consumption at home and away from home but does not affect poultry or fish consumption in either location. It was also reported that men eat more meat and fish than women, and meat consumption declines with age.

El-Qudadah (2016), assessed dietary knowledge among the females with diabetes attending outpatient clinics at several hospitals in Amman, Jordan. The study employed multiple regression analysis to identify factors influencing knowledge. It was found that occupation, duration of diabetes, diabetes history and education were the factors most influencing knowledge. They concluded that dietary knowledge of diabetic patients is inadequate and need improvement and recommend that there is need to set up a healthy education program to help improve the patients' knowledge.

Shimokawa (2011), "The Asymmetric Effect of Dietary Knowledge on Nutrient Intake in China: Implications for Dietary Education Programs Overall". The study demonstrates that dietary knowledge is associated with nutrient intakes in different ways, when people expect their food availability to increase from when they expect it to decrease. The result showed that improving overall dietary knowledge significantly reduces an increase in total calorie intake and intakes of carbohydrate, fat and protein when expected food availability increases, while insignificantly affects nutrient intake when expected food availability decreases. In symmetric models, the study finds a significant effect of dietary knowledge only on fat intake, and the magnitude of the effect is less than a half of the corresponding effect observed in an asymmetric model. They concluded that without distinguishing the direction of changes in expected food availability, there will be underestimation of the effect of dietary knowledge on nutrient intakes.

2.13 Market segmentation

Market segmentation is a concept in economics and marketing. A market segment is a subset of a market made up of people or organizations sharing one or more characteristics that cause them to demand similar product and services based on qualities of those products such as price or function (Wikipedia). Market segmentation involves detecting, evaluating and selecting homogeneous groups of individuals regardless of whether they are consumers or not with the intention of designing and directing appropriate competitive strategies (Ou *et al.*, 2009). Market segmentation is one of the critical elements in recent time used for selling of products and process of dividing the market into several groups and segment(s) based on factors such as demographic, geographic, and quality perceptions. By these, a better understanding of consumers' preferences could be revealed and thereby more effective marketing strategies adopted (Gunter & Furnham, 1992).

Founder of the market segmentation concept, Smith (1956), opined that market segmentation is a brief and temporary phenomenon. Effective use of this tool may result in more official recognition of market segments through seeing groups of customers as individual markets. Market segmentation refers to looking at a heterogeneous market as smaller homogeneous markets, to be able to change product preferences to significant market segments' needs (Smith, 1956). The underlying principle for segmentation is that the market is fragmented; hence, a homogenous market does not exist (Beane & Ennis 1987). Engel (1972) further put up with the view that consumers are different from each other, and that these differences influence market demand. These differences in consumers are of vital importance to undertake market segmentation. In marketing literature, segmentation is a central and prevailing concept, which offers directives regarding companies marketing strategies. Segmentation constitutes the focal point in marketing strategy and has been extensively adopted (Kamineni, 2005). Hunt and Arnett (2004) continued and argued that one of the most established views in modern marketing is market segmentation. According to Engel (1972), adopting segmentation have a wide range of advantages, especially concerning information needed. Market segmentation helps in achieving better profitability than expected (Wind, 1978). There are two main approaches to segmenting markets. The first approach is the breakdown approach which perhaps is the most established and well recognized and is the primary method used for segmenting consumer markets; the second is the build-up approach which seeks to move from the individual level where all customers are different, to a more

general level of analysis based on the identification of similarities (Freytag and Clarke, 2001).

Creative market segmentation strategies usually afford the business a strategic advantage over their competition and provide marketing efficiencies that significantly increase customer retention and profitability. Jerry (2009), opined that "The purpose of segmentation is the focus of marketing energy and force on the subdivision (or the market segment) to gain the competitive advantage within the segment. If a brand pours its entire budget into one communication medium (say, radio or magazine), it can control the segment of the market that listens to that radio station or reads that magazine. Charlie, (2002), affirmed that market segmentation is important because markets are becoming increasingly diverse and it is rare for mass marketing to be a profitable strategy. He concluded that market segmentation allows more precise and effective communication of benefits about needs and helps to identify growth opportunities. According to Goodstein *et al.*, (1993), segmentation is used to divide the market into groups of individuals that are characterised by similar preferences, to enable the identification of those that are the most interested in a particular product offer or marketing proposition. It allows organisations to study in depth the factors that influence the purchase decision of the target segments, so increasing their understanding on the behaviour of the consumers and enabling the formulation of marketing strategies that are relevant and accurate (Hassan and Craft, 2005). The benefit in taking advantage of a market segment rather than the market as a whole is that the individuals between the market segments have different preferences and price elasticity. Hence, providing the opportunity to organisations, to charge different prices by differentiating the same products to the needs or wants of each segment (Wenstein, 2004; Hassan, *et al.*, 2003; Levin and Zahavi, 2001; Webber 1998; Kara and Kaynac, 1997; Wyner 1995; Croft, 1994 and Dickson and Ginter, 1987).

2.13.1 Bases for market segmentation

There are different ways of categorizing Market segments: homogeneous preferences, referring to consumers that roughly have the same choices. Secondly, there are diffused preferences meaning that the consumers vary in their preferences and finally clustered preferences suggesting that the natural market segments emerge from groups of consumers with shared choices (Kotler and Keller, 2009). Common segmentation bases include variables such as usage frequency (Twedt, 1967), brand loyalty (Boyd and Massy, 1972), usage situation (Dickson, 1982; Loudon and Bitta, 1993 and Wedel and Kamakura, 2000),

demographic and socio-economic variables, e.g. geographical location, household/firm size, household/firm life cycle, age, gender and media usage (Blattberg, *et al.*, 1976; Michel and Kamakura, 2000). In Nigeria, the term household is preferred for market studies instead of the family because household encompasses both related and unrelated occupants of a housing unit (Ogidi *et al.* 2012). The segmentation method of a market is expected to produce different customer groups which is required to evaluate the relative attractiveness of the market segment identified and select the target segments(s) that it will seek to serve for the enterprise (Crawford, 1997).

Theoretically, consumers' wants are heterogeneous, leading to different product preferences. The purpose of market segmentation is to observe the heterogeneous market as several smaller, more homogeneous segments which have internally similar product preferences and externally different product preferences. This market allows producers to satisfy their customers' wants with more precision, in comparison with trying to meet the desires of the entire market. That is, by adjusting marketing effort to the requirements and wants of consumer groups, producers can secure product demand of the target market (Smith, 1956). There are six criteria for effective market segmentation; identifiability, accessibility, responsiveness, actionability, stability and substantiality (Kotler, 1997; Wedel and Kamakura, 2000; Yankelovich and Meer, 2006). This process is known as differentiating or positioning the product, which is the benefit of the segmentation process (Kotler and Keller, 2006; Borna and Chapman, 1993; Smith, 1956).

The local rice brands with their attributes are favoured by some Nigerians who are still attached to their traditional foods. If such people demand these local brands, then quality should be met, and consumers targeted through market segmentation. From the segmentation point of view, consumer quality perception is crucial for successful acceptability. Some of the marketing application that will enhance consumers' consumption include; *Market-Opportunity Analysis*, which involves investigating the trends and conditions in the marketplace to identify consumers' needs and wants that are not being fully satisfied. *Target-Market Selection*, this has to do with identifying distinct clusters of consumers who have unique wants and needs and the selection of segment that matches the strength and offer better opportunities. *Marketing-Mix Determination*, which involves developing and implementing a strategy for delivering a compelling combination of want-satisfying features to consumers within the target market. The marketing mix is made up of four components; product, price, promotion, and place.

There are four traditional market segmentation approaches in marketing research, which are geographic, demographic, psychographic, and behavioural variables. Thus, these variables can be used to segment consumers. Kotler (2005), opined that traditional market segmentation methods are the significant variables in market segmentation. Geographic variables are such variables as country size, city size, and density. Segmenting on demographic variables involves dividing consumers about their age, life cycle, income, and occupation. The psychographic variables cover social class, lifestyle, and personality. The behavioural variable consists of benefits sought, usage rate, and purchase occasion (Kotler *et al.*, 2005). Each of these variables offers essential insights into the understanding of the market. Apart from these traditional approaches, the market can also be clustered by hobbies, by political affiliation, by religion, by special interest groups, by sports team loyalties, by university attended, and hundreds of other variables.

Sausner (2006), opined that awareness about new, potential segment groups can be of help to enlighten the implementation of marketing strategy. This study needs a method, which can identify the household to comprehend the multifaceted reasons and motives behind the consumer's behaviours and actions. Rosenthal and Capper (2006) claim that the boundaries that base product innovation decisions on listening to consumers' voices have contributed to the use of new research techniques, for example, ethnographic studies. According to Arnould and Wallendorf (1994), ethnographic studies are appropriate to use for marketing to comprehend the meaning of consumption gatherings in specific market segments. Ethnographic studies can capture more profound knowledge of consumers as it focuses on consumers underlying action, thoughts, and feelings, instead of listening to what consumers have to say.

2.13.2 Market segmentation for consumer goods

Michael (2007), quoted that, consumers' opinion research has a well-established track record, and conducting consumer opinion research among businesses is much more problematic. Therefore, market segmentation for consumer goods becomes relevant. The tenacity of segmentation is to divide customers into distinct clusters, such that marketing information can address their detailed needs. There are some general criteria for the establishment of these different clusters. The cluster of customers should share more commonalities within each cluster. The simple demographic-based segmentation approaches gave way to psychographic segmentation which focuses on lifestyle choices. Polpinij (2004) penned that

due to the competitive market, many firms' operators are continually searching for alternative methods to supplement their income. One way of business is market segmentation analysis. Therefore, the conventional approaches to segmentation such as demographic and behavioural segmentation schemes are well known. Knowledge of consumer preference is of importance in strategic marketing activities. Marketing strategies and tactics depend on explicit or implicit beliefs about consumer behaviour (Ogidi and Abah, 2012). Therefore, this study used cluster analyses to segment local (ofada) rice consumers household based on their quality perceptions of this local rice variety.

2.13.3 Quality perceptions and consumer segments

Different frameworks have been described for the analysis of food quality perceptions. The attention of this study is focused on households' local (ofada) rice quality perceptions and consumer segments, which differ according to their food-related lifestyle.

Steenkamp, *et al.*, (1986), identified four different quality dimensions by consumers covering thirteen food products. These are nutritional value (correlations with attributes like protein content, vitamin content and nutritional value), additives (correlation with preservatives, artificial flavour and colour additives), energy (correlation with attributes like fat, protein and caloric content) and sensory (correlating with smell, appearance and taste). The food products differ considerably with respect to the importance attached to the four dimensions. Grunert, *et al.*, (1996) identified four other quality dimensions, which more or less coincide with those that were shortly described above. They are called taste and appearance, health, convenience and process. The important dimension of quality for consumers is related to the hedonic characteristic of food, which is presented by taste, appearance and smell. This hedonic characteristic can only be ascertained after consumption and therefore, it is called experience characteristic of food.

Health, on the other hand, has become a very important food characteristic to consumers and they consider it as important as taste. Consumers form preferences for this food characteristic motivated by expectations for a longer, high-quality life (Roininen, *et al.*, 1999). This characteristic of food quality is related to the way consumers perceive food to affect their health. This dimension includes functional qualities of food, but also safety and risk-related issues. The health quality of food is a credence characteristic, because consumers cannot establish the consequences for his/her health right after consumption, so the consumer needs to trust this characteristic. Consumers consider convenience as an important experience

quality dimension of food but it means much more than just ease of purchase or quick consumption. According to Gofton, (1995), consumers perceive the quality dimension convenience as such that saves time in the overall meal process: planning and purchasing, storage and preparation of products, consumption, and the cleaning up and disposal of leftovers.

Finally, consumers are also interested in the way food is produced, that is the production process dimension of quality. This characteristic covers organic production, production that takes into account animal welfare, and production with no genetically modified organisms. Those consumers that pay attention to the process dimension of food quality focus on the natural state of the food. Just like the health dimension, process dimension is a credence characteristic, since the consumer has to trust various sources for the production-oriented quality of food. All the four dimensions of food quality are interrelated and sometimes overlapping but it depends on the food product. For example, consumers sometimes consider taste and healthiness of food to be positively correlated, in other times, they are negatively correlated. Such kind of assumptions are typical of consumer quality perception. Also, none of the four quality dimensions is a search dimension (except for the cases when food can be tasted in the store before purchasing it). This means that consumers can only establish the quality of a particular food product only after consumption, not before or during purchase. Thus, purchase decisions are based on quality expectations. Quality expectations are formed based on previous experience with the product or on familiarity with the brand. Thus, quality expectations are inferred.

Therefore, hedonic and convenience quality are experience dimensions, because the consumer can experience the quality and use this experience in future purchases. Health and process dimensions, on the other hand, are credence characteristics of quality and the consumer cannot experience the quality. Therefore, the last two dimensions are a question of credible communication. The effectiveness of communications depends on three factors: the credibility of the source, the receiver's motivation and ability to process the information (Grunert, *et al.*, 2000). Credibility of the sources will be further discussed in the development of the thesis.

2.13.4 Segmentation of food consumers

The importance of the four quality dimensions that were just described differ among consumers. That is, the process of food quality perception and consequently, the choice of

food they make is individually defined. Although there are individual differences, people can be segmented according to specific traits that explain the way people relate food to the attainment of values. These traits, called food-related lifestyle (Grunert, *et al.*, 1996), are non-product specific and can be summarized as purchasing motives, quality aspects, shopping habits, cooking methods, and consumption situations.

Consumer's peculiar or personal factors are included as one of the determinants of consumer purchase behaviours. The relative importance of rice quality attributes differs between consumers. Generally, the processes of food choice and quality perception are characterized by individual differences (Wedel and Kamakura, 2000). During shopping, consumers are often exposed to various kinds of quality attributes, and also in the way they prepare and eat their meals, with resulting differences in the quality experienced during consumption as well as general perception about the food. Furthermore, the purchase motives driving the food choice and quality perception process will differ between consumers (Ogidi *et al.*, 2012). To take account of these differences, it is useful to distinguish between different categories of food consumers. We categorize consumers according to their different ways of shopping for food, ways of preparing meals, eating situations, ways of weighting quality dimensions and purchase motives for food, i.e. their food-related lifestyle (Brunsø and Grunert, 1998), which we define as the general pattern of how consumers use food to fulfil basic motives or attain life values.

Uninvolved food consumers: These consumers find life's challenges in other areas than food. Their purchase motives for food are weak, and the interest in food quality is only related to the convenience dimension. They are uninterested in shopping, lack brand loyalty, and cannot perceive differences among different food products. Their price interest is also low. They mostly eat snacks, have little interest in cooking, and tend not to plan their meals. These consumers are, on average, young, single, living in big cities, with low-level of income.

Careless food consumers: These consumers share some of the characteristics of the uninvolved consumers in that they do not find food important and focus only on the convenience quality. However, they are interested in new products, but as long as they do not require new cooking methods. They are young, living in big cities, with more education and higher income in comparison to the uninvolved consumer.

Rational food consumers: These are the consumers who are most open to better quality food products with functional characteristics like, health importance, natural state, freshness. They

look for a lot of information when shopping, which makes them easy to inform about product improvements. New products are not appreciated, so information about product improvements should be communicated. The major purchase motives for these consumers are self-fulfilment, recognition and security. This segment is represented mostly by women with families, who live in medium-sized cities. This segment is considered to consist of highly critical consumers.

Conservative food consumers: The major purchase motive for these consumers are security and stability by following traditional meal patterns. They are very interested in taste and health aspects of food, so the convenience factor is not prioritized. This segment is difficult to win with new products or different marketing initiatives, because they have concrete preferences for food and shops. Consumers in this segment are least educated, living in rural areas and have generally low income.

Adventurous food consumers: This segment is represented by consumers who use food and cooking for self-fulfilment, expressing creativity and social purposes. They are not interested in convenience but insist on good food quality and good taste. They are interested in exotic food products and like to experiment in cooking. These consumers are young and members of large size family. They have the highest education, high income and live in big cities.

2.14 Hedonic price function

The hedonic model assumes that there is a continuous function relating the price of a good to its attributes (the hedonic price function). Hidano (2002) defines the hedonic approach as a method of ascertaining the value of or the pleasure felt from attributes of a good. In contrast to conventional economic evaluation, where the value of a good is calculated for the whole of the good, the hedonic approach regards a product as a set of attributes and considers the value of a good as a function of each attribute of that good as coined by Lancaster (1966). The value of an attribute is called an implicit price because it cannot be observed in a real market. Hedonic analysis records prices paid at purchase, observable and unobservable attributes of product and estimates implicit payment for attributes with a multivariable regression method. Rosen (1974) asserts that producers tailor their goods to embody final characteristics desired by consumers and receive premiums for them. These premiums arise from specialized production achieved by specialization and government policy. This method has been applied to a wide range of economic issues ranging from durable goods (houses, amenities) to non-durable goods like agricultural products. Hedonic pricing draws from revealed preference to

estimate the value consumers place on non-market goods and is based on utility maximization theory. This method has traditionally been used for the evaluation of public goods and environmental goods. More recently it has been applied in market research for private goods like houses, automobiles and food products among other commodities.

2.14.1 Empirical studies on hedonic price function

Scholars have investigated the relationship between product quality, nutritional characteristics and prices of different food products. In general food quality attributes can be classified into four groups namely: sensory attributes (taste, smell, and appearance), health attributes (nutritional benefits), process attributes (organic against GMO) and convenience attributes (time and energy saving) (Grunert, 2003). Hedonic models have been used to derive implicit values of product characteristics including rice, cotton, wool, wheat, grapes, wine, pork, tomatoes, asparagus, vegetables and beef among others. Apart from hedonic models, techniques such as conjoint analysis and choice models have been used to examine consumer preference for food products.

In the first known application of hedonic pricing to agricultural products, Waugh, (1929) gathered data on the prices of vegetables like asparagus from the Boston market in 1927 with the aim of explaining the determinants of the price differences for the average price of a bundle of asparagus. He found that the price of asparagus was correlated with the length of the green portion (asparagus with eight inches of green portion was 8.5 cents higher than that with five inches). Drawing him to the conclusion that Bostonians place more importance on the green part of asparagus.

Schnettler (2009) suggests that the effect of the country of origin means consumers use a product's origin as an attribute related to its quality. This is supported by the findings of Hara (2000) who estimated a hedonic function for the Japan rice market. He found that consumers pay a premium for domestic certified rice, pesticide free and fertilizer free rice in comparison with imported rice. Tomlins (2004) investigated consumer preferences and acceptability of domestic and imported rice in Ghana. He found that consumers prefer imported raw and parboiled rice to domestic rice, and that acceptability was influenced by location and gender. Rutsaert (2009) used Vickrey second price auctions to compare consumer willingness to pay for Senegal rice and Thai rice and found that consumers are willing to pay up to 80% more for local rice than imported rice. He concluded that bids are influenced by taste whereas socio-demographic factors are not important.

Duff (1991) asserts that changes in consumer demand are a result of changes in taste and income. As incomes increase consumers are able to substitute more preferred for less preferred foods, the assumption being that consumers desire to improve their diets. Grazia (2007) found that organic food was highly valued by consumers due to perceived benefits to the environment and consumer's health. Ara (2003), valued organic rice in the Philippines and found that consumers were concerned with health risk and the farm environment and certification of products.

Juliano *et al.*, (1992) found that in Hong Kong consumers pay high premiums for long grain, whole grain, flaky and soft textured rice. Italians prefer chalky grain with harder gel. Germans are particular with the level of processing and packaging type and types of outlets. In Thailand consumers prefer soft but flaky rice, percentage of broken grain and kernel length are more important than presence of impurities. They concluded that consumer preferences depend on historical and socio-cultural factors and that families in which both spouses work and spend significant time commuting have more demand for convenience foods. Baker (1999) used conjoint analysis to evaluate consumer responses to hypothetical apple products which include price, quality and pesticide use levels and health risk. He found the market is comprised of four segments of consumers, that is, those who have a strong preference for food safety whereas some exhibit a more balanced desire for all product characteristics, some are extremely price sensitive and others have a strong preference for product quality. Mishili (2007) investigated consumer preference of cowpea grain quality characteristics in West and Central Africa and found that consumers pay a premium for large cowpea grains and discount damaged grains. Dalton, (2004) derived a hedonic model formulation based on the model of the agricultural household. He then investigated the statistical relevance of consumption attributes using experimental data and concludes that rice breeders should consider post-harvest attributes in addition to production traits. Important determinants include income level, taste of product and market price.

Hassine-Belghith (2009) studied the association between exporting and product quality and found that exporting results in quality upgrading and more efficient use of resources. The results also showed that there is a positive relationship between product quality and productivity growth. Although food security takes the central role at national level for a self-insufficient country, a country like Benin with a comparative advantage in rice production can take advantage of the opportunities presented by the emerging consumer preferences for imported rice by improving product quality to penetrate the export market. A combination of

good quality products and sound agricultural policies can improve product quality and production efficiency. Recent trade liberalization efforts by the World Trade Organization could present real opportunities to producers. Trade may play a key role in encouraging rural development, promoting the modernization of the traditional sector and enhancing product quality and technical efficiency (Juliano, 1992).

2.15 Profile deviation analysis

The concept of fit has become an important building block for theory building in several research fields, most notably in strategic management and organization science, where the analysis of organizational performance often is of major concern (Boyd *et al.*, 2012; Malhotra *et al.*, 2013). The system approach views fit as multidimensional consistency of organizations relative to an ideal or benchmark organizational type. Fit measurement hence implies assessing “the deviations of a real organization from one or more ideal-type organizations”, with the ideal types “represented by multivariate ideal profiles that provide the correspondence between the verbal descriptions of the ideal types and the measures used to assess real organizations” (Doty *et al.*, 1993).

The trend toward a multivariate or systemic analysis has been labelled by Miller (1981) a “new contingency approach” that “seeks to look simultaneously at a large number of variables that collectively define a meaningful and coherent slice of [organizational] reality”. The basic implication of the assumption is that a multivariate ideal profile, or rather a profile of key dimensions, can be obtained for high-performing units, then any deviations from this profile should lead to negative performance effects (Venkatraman and Prescott, 1990). A test of this conceptual framework can be performed using profile deviation analysis (Doty *et al.*, 1993), which requires three essential steps (Venkatraman and Prescott, 1990): (i) identifying the organizations that are the best performers; (ii) describing their profile along the critical dimensions (variables); and (iii) testing the performance implications of deviations from such a benchmark profile. In that context, specifying the ideal or benchmark profile is of major importance; which Venkatraman and Prescott (1990) labeled the “calibration sample” of best-performing entities.

CHAPTER 3

Effect of Households' Dietary Knowledge on Local (Ofada) Rice Consumption in South-West Nigeria¹

3.1 Introduction

In this chapter, the methodologies and the empirical results on effect of households' dietary knowledge on local (Ofada) rice consumption are presented and discussed. The entire chapter is structured as follows: 3.2 presents the theoretical and conceptual framework, while 3.3 reports model specification. Section 3.4 constitutes the description of the study area, data collection, sampling techniques and the description of variables used in the model. In section 3.6, the empirical results and discussions are presented while section 3.7 concludes the chapter with a summary of the results as well as the recommendations.

3.2 Theoretical and conceptual framework

This study is built on a standard model influenced by Becker (1965), Lancaster (1966) and Grossman (1972) of consumer demand that assumes individuals gain utility from the foods they eat (F), quantity consumed (y), and a composite non-food item (N). In this model, quantity of rice consumed is assumed to be determined by some exogenous factors (φ) which include age, gender, household size etc. It is also specified that rice consumption can be affected by some endogenous factors (α) such as being a household meal planner, presence of household member on special diet etc., by way of dietary knowledge (η). This study is thus, based on the assumption that individual's choices are constrained by prices (P) and income (I). As such, it is assumed that an individual (i) maximizes utility subject to a budget constraint and dietary knowledge. The derived consumption function for rice is expressed in equation (1) as:

$$y_i = f(P_i I_i \varphi_i \eta_i(\alpha_i)). \quad (3.1)$$

Where y_i is the quantity of rice consumed, P_i is the price of the commodity, I_i is household income, φ_i are the exogenous factors influencing consumption, α_i represents factors that are determined by dietary knowledge, and η_i is household dietary knowledge.

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The common problem with consumption studies is that food consumption data from cross sectional surveys usually contain notable proportion of observations not consuming certain food items (Yen *et al.*, 2010). Thus, statistical procedures not accommodating censoring or endogeneity produce bias estimates (Ormond, 2014). In this study, some respondents report zero consumption of local (ofada) rice. Zero consumption may be due to lack of dietary knowledge of respondents about local (ofada) rice. Estimating consumption of local (ofada) rice variety without accounting for respondents with zero consumption will yield inconsistent parameter estimates (Mancino and Carlson, 2005; Yen *et al.*, 2008). This is a feature of a censored dependent variable. Moreover, dietary knowledge included in the consumption equation is potentially endogenous and creates a statistical problem of endogeneity, which indicates that an independent variable included in the model is potentially a choice variable, and variables can be jointly determined which leads to correlation between the unobservable and the disturbance term (Chenhall and Moers, 2007; Ormond, 2014). According to Ormond, (2014), the possible endogeneity problem has two implications: first, the parameter estimate will be biased and inconsistent while the model will fit too well, making the magnitude of the parameter estimates unreliable; secondly, it makes interpretation of the parameter estimates difficult.

The most common way to deal with the problem of endogeneity is with the use of Instrumental Variables (IV) (Yen *et al.*, 2010). An instrument is a proxy for the endogenous explanatory variable X that is highly correlated with other explanatory variables but is uncorrelated with the error term of the consumption equation (Brookhart *et al.*, 2010). Therefore, to explicitly account for endogeneity, the Instrumental Variable Tobit (ivtobit) was adopted to estimate the simultaneous equation. The Instrumental Variable Tobit (iv-Tobit) is a hybrid Tobit model, where one or more of the regressors is endogenously determined. Maximum Likelihood Estimate (MLE) was used to estimate the parameters because it assumed that the endogenous regressor is continuous as the case of dietary knowledge in this study. The criteria for over-identification, and endogeneity for MLE were met as in the case of instrumental variable estimation for which exclusion condition are needed for identification.

Choosing instrument for correcting endogeneity might be problematic (Asfaw *et al.*, 2013), as this study follows Yen *et al.*, (2008) who hypothesised that variables like education, a household member on a special diet, and being a household meal planner will not influence consumption directly. Thus, these variables were used in the knowledge equation, though

they may have indirect impact on consumption by way of dietary knowledge equation. It is pre-empting that people with these characteristics are more likely to have better and adequate knowledge of what they consume.

3.3 Model specification

Based on the above and in line with econometric model used by Yen *et al.*, (2008) and Lin and Yen (2008), a simultaneous equation system was developed in which consumption variables (y_i) for local (ofada) rice was set to zero (censored) with endogenous continuous variable for dietary knowledge (d_0) included among the explanatory variables for the consumption equation. The endogenous regressor, dietary knowledge (d_0) equation is specified as:

$$d_0 = z' \alpha + \mu_0 \quad (3.2)$$

The censored equations for local (ofada) rice (y_i) can be expressed as:

$$y_i = \max(0, x' \beta_i + \gamma_i d_0 + v_i) \quad (3.3)$$

Where:

d_0 = dietary knowledge of the respondent,

y_i = quantity of local (ofada) rice consumed

Z and x = vectors of exogenous variables

α and β_i = vectors of parameters

γ_i = scalar parameters

μ_0 and v_i = error term

Such that $[\mu_0, v] \equiv [\mu_0, v_0, \dots, v_m]$ are distributed as $(m+1)$ -variate normal $N(0, \Sigma)$, with a finite covariance

$$\Sigma = \begin{bmatrix} \sum_{\sigma_0^2} & \sum_{12} \\ \sum_{21} & \sum_{22} \end{bmatrix}, \quad (3.4)$$

Such that $\sum_{\sigma_0^2}$ is a scalar, $\sum_{21} = \sum_{12}$ is $m \times 1$ and \sum_{22} is $m \times m$. This model is like the simultaneous equations system of Smith and Blundell (1986) with only one censored equation as equation (3.2). Also, the logarithmic transformation on y_i and the presence of the endogenous regressor, d_0 , the censored system (3.2) is in line with the model specified by

Amemiya (1974) and Yen *et al.*, (2008) for cross sectional data with constant prices as in the present study. This ivtobit procedure produces reliable, and efficient parameter estimates, which permits an appropriate test of endogeneity of the dietary knowledge variable through the statistical significance of the augmented regressor \hat{u}_0 in the censored equation in equation (3.2).

3.4 The study area and method of data collection

This study was carried out in South-western part of Nigeria. The region is one of the six geopolitical zones in Nigeria and is made up of six States, which are: Lagos, Ogun, Oyo, Osun, Ondo and Ekiti States. The data used for this study were collected from a survey of 600 households conducted from three States (Lagos, Ogun and Osun), purposively chosen due to the increasing level of local (ofada) rice production and its presence in the local markets across these States. A multistage sampling technique was employed to select the respondents in the study area. Firstly, the study purposively selected three states, as earlier mentioned, Lagos, Osun and Ogun because of the predominance of local (ofada) rice farmers in the states and its presence in various markets across the States. This same technique was adopted in the second stage to select two Local Government Areas (LGAs) from each selected State. The third stage involved a random selection of two wards each from the two LGAs selected in the second stage based on lucky-dip approach (Erhabor and Ojogho, 2011). While the last stage involved a random selection of 50 rice consuming households in each of the two wards which sum up to 600 respondents used for the study.

Food consumption and expenditure data of different households were also collected and used for the study. This was done using well-structured questionnaire to collect required information from heads of households or their representatives, where the heads were not available. The information sought include the households' rice consumption data, their demographic and socioeconomic characteristics. Rice consumption information collected include brand of rice consumed, frequency of consumption, quantity consumed per month, price per kilogram and expenditure on rice consumed by the households during the sample period. In relation to dietary knowledge, respondents were asked to rate the importance of adding salt or sodium to food in moderation and preferring a diet low in saturated fat. Specifically, they were asked whether they were aware of the nutritional superiority of local (ofada) rice to imported rice in terms of fibre, protein and phosphorous contents and low moisture content among many others in addition to better taste.

3.5 Definition of variables

Dependent variables

The dependent variable in knowledge equation used in this study is constructed from answers to two sets of questions: general dietary guidance and nutritional awareness specific to rice consumption. The sum of the correct answers to the number of questions asked were used to construct the dietary knowledge variable. On the other hand, the dependent variables for consumption equation is the quantities of local (ofada) rice consumed, measured in kilogram.

Independent variables

The independent variables for rice consumption include household income, household size, gender, age, location (Lagos, Ogun and Osun States), price, consumption place, dietary knowledge, level of education (measured in year), sources of dietary information, and occupation. The study hypothesised that dietary knowledge affects local (ofada) rice consumption, and this dietary knowledge variable is endogenized in the system of demand equations. Therefore, in addition to afore-mentioned variables, dietary knowledge is assumed to be affected by being a household meal planner and by any family member(s) on special diet.

3.6 The empirical results and discussions

3.6.1 Descriptive statistics

The sample descriptive statistics for all variables are presented in Table 3.1. The average quantity of local (ofada) rice consumed by a household ranges from 6.19kg to 25.8kg per month. Individual households consumed a minimum of 37.03kg and maximum of 58.9kg of both rice varieties per month on an income ranging from ₦38,265.35 (\$106.29) to ₦157,224.71 (\$436.74)². The dietary knowledge score registered an average of 4.67 (out of 10).

² Note ₦360 = \$1

Table 3.1: Descriptive statistics of the variables used for the study (n=600)

Variable	Definition	Mean	Standard Deviation
<i>Dependent variables</i>			
Quantity of local (Ofada) rice	Quantity of rice consumed (Kg) Local (Ofada) rice consumed per month (Kg)	15.98	9.79
<i>Endogenous variable</i>			
Dietary Knowledge Score	Sum of 10 binary indicators covering respondent's dietary knowledge	4.67	0.24
<i>Continuous variables</i>			
Income per month	Household income per month (₦)	97745.03	59479.68
Household Size	Number of people in the household	3.52	1.80
<i>Discrete (binary)</i>			
Gender Dummy, Male = 1, Female = 0	Male or Female	0.52	0.50
Age 20-30	Respondent between age 20-30	0.22	0.41
Age 31-40	Respondent between age 31-40	0.40	0.49
Age 41-50	Respondent between age 41-50	0.30	0.46
Age above 50	Respondent age 51 and above	0.12	0.33
Personal	Personal source of information is the information gained through personal experience	0.31	0.46
Family Member	Information from family member	0.25	0.43
Associates	Information from associates	0.09	0.28
Nutritionist	Information from nutritionist	0.15	0.36
Health Care Professionals	Information from healthcare professionals	0.18	0.38
Household Meal Planner	Meal planner is the one who takes time to plan the meals for the household.	0.64	0.48
Member on special diet	Whether any household member is on special Diet	0.06	0.24
Farming	Farming occupation	0.09	0.29
Civil Servant	Salary earners (Government and Private workers)	0.61	0.49
Artisan	Artisans are workers in a skilled trade	0.22	0.41
Lagos	Resides in Lagos State	0.41	0.49
Ogun	Resides in Ogun State	0.42	0.49
Osun	Resides in Osun State	0.41	0.49
Home	Rice consumed at home	0.78	0.41
Away	Rice consumed away from home	0.28	0.45
No formal Education	No formal education	0.05	0.21
Adult Literacy	Adult education	0.05	0.22
Primary	Primary education	0.04	0.20
Junior Secondary	Junior secondary education	0.04	0.20
Senior Secondary	Senior secondary education	0.10	0.30
Tertiary	Tertiary education	0.61	0.49

3.6.2 Maximum likelihood estimates of dietary knowledge

The parameter estimates and standard error for the dietary knowledge are presented in Table 3.2. The result shows that gender, being a household meal planner, presence of household member(s) on special diet, and respondents residing in Ogun and Osun States significantly influence dietary knowledge. Given the normalization in the measurement model, a positive coefficient in the knowledge equation indicates the corresponding variable increases the probability that a person is more aware of the nutritional contents of rice brand she/he consumes.

Table 3.2: Maximum Likelihood Estimates (MLE) of dietary knowledge.

Variables	Coef.	Robust Std. Err.	<i>P</i> -value
Age	-0.003	0.002	0.104
Year of education	0.008	0.014	0.558
Gender (Female = 0)	0.395***	0.057	0.000
Household meal determinant	0.069*	0.040	0.089
Member on special diet	1.800***	0.085	0.000
<i>Occupation</i>			
Farming	-0.057	0.074	0.448
Civil Servant	0.058	0.050	0.252
Artisan	0.091	0.065	0.165
<i>Location/State</i>			
Lagos	-0.006	0.050	0.903
Ogun	-0.093*	0.048	0.055
Osun	0.194***	0.048	0.000
<i>Sources of Information</i>			
Personal	0.093	0.057	0.101
Family Member	0.071	0.052	0.169
Associates	0.026	0.067	0.693
Health Care Professionals	0.073	0.061	0.230
Constant	0.852***	0.113	0.000
Number of observations	600		
R ²	0.504		
F (15, 585)	33.66***		
<i>p</i> -value	0.000		

*Note: *, ** and *** denote significance at 10%, 5% and 1% level, respectively*

The estimates (Table 3.2) show that the coefficient of being a household meal planner is statistically significant and positively affects dietary knowledge. This result is expected, as it lends credence to the fact that people in such position should be more aware of food they consume. Further explanations for this may be due to adequate information regarding the dietary contents of local (ofada) rice, and/or the simplicity of the available information written on the labels for those consuming packaged ones (Kamen *et al.*, 2012). Another likely

reason could be that household meal planners use dietary information effectively when making decisions on food to consume (Jacobs and de Beer, 2010).

Also, coefficient of presence of household member(s) on special diet is statistically significant and positively correlates with dietary knowledge. This shows that households with such individuals are more aware of the nutritive benefits associated with the consumption of local (ofada) rice. The reason could be that, it is expected that consumers who follow a special diet should have knowledge of food to consume, as they are more informed about the relationship between diet and health. Also, it could be as a result of adequate dietary counselling provided to the participants when they are diagnosed with a specific medical condition (Wiles, 2006; Jacobs and de Beer, 2010).

The coefficient of gender is significant and positively affects dietary knowledge. This implies that women on the average are more knowledgeable about nutritional benefits associated with local (ofada) rice consumption. The possible explanation could be that women are more apt to receive formal and informal education on food preparation and relevant diet information (Jayachandran, *et al.*, 1995). Also, the traditional role of female consumers as the gatekeepers of household food choices and purchases could motivate their interest to be knowledgeable about right food choices (Wiles, 2006). In addition, their responsibility towards the well-being of their family also create an awareness of the nutritional content of food (Jacobs and de Beer, 2010).

Another factor, the coefficient of location of Osun exhibits a positive and significant effect on dietary knowledge. The result implies that regional differences exist as regards households' knowledge of nutrition and health benefits of local (ofada) rice. So, respondents in Osun State are more knowledgeable about nutrition and health benefits of local (ofada) rice compared to Ogun State. This is evident in the coefficient of Ogun State having negative and statistically significant correlation with dietary knowledge. A likely explanation for this is that majority of respondents in Ogun State are farmers and probably have not received formal education required to make a significant difference in accumulating such information regarding the health benefits associated with local (ofada) rice. As opined by Yen *et al.*, (2008) and Lin and Yen, (2008), in their separate studies, that a larger percentage of respondents with educational attainments are able to answer dietary knowledge questions correctly.

3.6.3 Estimates for Local (Ofada) Rice Variety with Endogenous Dietary Knowledge.

The dietary knowledge and consumption equations error correlation gives room for endogeneity of dietary knowledge in the corresponding consumption equation (Yen *et al.*, 2008). As a result of the significance of error correlations, the hypothesis of exogenous dietary knowledge is accepted at 5% level for local (ofada) rice. Test results for endogeneity and simultaneity are confirmed by likelihood ratio tests, with p -values <0.0001 for a censored equation system with exogenous dietary knowledge variable.

Table 3.3 presents the results of estimated parameters for consumption equations with endogenous variable.

Table 3.3: Parameter estimates for local (ofada) rice variety with endogenous dietary knowledge

Variables	Coeff.	Robust Std. Err.	P -value
Income	-4.530*	2.413	0.061
Household Size	0.111	0.743	0.882
Dietary Knowledge	3.708**	1.534	0.016
Year of education	0.650**	0.281	0.021
Gender (Female = 2)	0.062*	0.036	0.085
Price	5.434**	2.264	0.016
Country of origin	11.189***	2.293	0.000
Household meal determinant	-0.112	0.855	0.896
Member on special diet	1.008	0.774	0.193
<i>Occupation</i>			
Farming	-2.567**	1.240	0.038
Civil Servant	-0.585	1.003	0.560
Artisan	-3.747***	1.227	0.002
<i>Location/State</i>			
Lagos	3.681***	1.137	0.001
Ogun	-0.169	0.911	0.853
Osun (Base category)	-1.070	1.165	0.359
<i>Sources of Information</i>			
Personal	4.004***	1.122	0.000
Family Member	-4.207***	0.921	0.000
Associates	-2.353**	1.019	0.021
Health Care Professionals	7.479***	1.636	0.000
Constant	13.108	10.639	0.218
Number of Observation	600		
Chi ² (1)	5.580**		
P -value	0.018		
Wald chi ² (20)	158.81***		
P -value	0.0000		

Note: *, ** and *** denote significance at 10%, 5% and 1% level, respectively.

Thirteen variables were statistically significant in influencing the consumption of local (ofada) rice. These variables include income, dietary knowledge, year of education, gender, price, country of origin, occupation (farming and artisan), Lagos location, and source of information (personal, family member, associate, and health care professional).

The coefficient of income is negative and statistically significant in influencing consumption of local (ofada) rice. According to classical microeconomics, demand is a positive function of income, for normal goods. That is, increase in income should bring about increase in the demand for a product. However, in this study, the reverse is seen. As income increases, consumption of local (ofada) rice decreases. It is however not surprising that the study found an inverse relationship between consumption and income; generally, the tastes of high-income earners are most likely to orient towards foreign goods than local goods. The evident explanation for this could be that households with higher income would probably want to consume imported rice brands that are easy to prepare than local (ofada) rice which have been found difficult to prepare, due to the notion that local (ofada) rice is ‘dirty’ as it harbours a lot of foreign matters. This agrees with Wardle *et al.*, (2000), who asserts that people from higher socio-economic and educational status tend to consume foods which are more luxurious and easier to prepare than foods consumed by those of lower socio-economic and educational status.

Coefficient of dietary knowledge is statistically significant and is seen to positively influence consumption of local (ofada) rice. However, scores from knowledge questions show that respondents do not necessarily have adequate understanding of the nutritive value of local (ofada) rice. This result confirms the study of Danbaba *et al.*, (2011) and PropCom, (2009), who found that nutritional quality and intrinsic cues such as taste, are key factors responsible for the consumption of local (ofada) rice unlike imported varieties consumed due to relative ease of preparation. As opined by Ayinde *et al.*, (2013) and Gyimah-Brempong *et al.*, (2016), local (ofada) rice has a rough surface, it’s more phosphorous, contains fibre which helps in the reduction of the risk of bowel disorder, fights constipation, and contains an appreciable amount of selenium which has been found to be effective in fighting colon and breast cancer. Osaretin *et al.*, (2007), and Danbaba *et al.*, (2011) also found that local (ofada) rice variety contains higher proteins at raw, cooked, and soaked states as compared to imported rice.

The coefficient for year of education is positive and statistically significant in influencing the consumption of local (ofada) rice. The implication for this is that, additional years of education of respondents will bring about increase in the consumption of local (ofada) rice.

This result is expected because educational attainment is assumed to have a positive correlation with food consumption. The influence of education on local (ofada) rice consumption could result from the social context, as educated heads of households may want to consume high-quality rice varieties such as local (ofada) rice as a form of prestige.

The coefficient of gender was positive and significantly influences the consumption of local (ofada) rice. This means that the probability of consuming local (ofada) rice was higher with female-headed households than male headed-households. This is a significant finding considering the core role women play in household food choice and provision as opined by Demont and Ndour (2015). Thus, food provision is not the role of women in Nigeria rather, food choice. This result agrees with the study of Tomlins *et al.*, (2007) who stated that gender is one of the factors that influences households' consumption of rice.

The price of the product also has a positive coefficient and it's statistically significant in influencing the consumption of local (ofada) rice. This indicates that, holding other factors constant, respondents in the study area will be more likely to choose local (ofada) rice even if its price is higher. Thus, increments on the price of local (ofada) rice will not decrease the associated utility level provided by the choice option. The possible explanation could be as a result of the nutritional quality of local (ofada) rice as opined by Gyimah-Brempong, *et al.*, (2016) and Osaretin *et al.*, (2007), that local (ofada) rice is more nutritious than foreign rice, thus influencing its demand.

The coefficient of country of origin is statistically significant and positively influences the consumption of local (ofada) rice. The result suggests that country of origin is a very important factor in household purchasing decisions. This implies that respondents are consuming local (ofada) rice because it is grown and processed in Nigeria. Country of origin has been found to be a key variable in explaining consumers' willingness to pay a price premium for a product (Naseem *et al.*, 2013). The likely reason for this might reflect their concern for domestically produced rice and not for economic benefits. Another reason could result from indigenous connectivity of the society wherein local (ofada) rice is found which can be established on the ethnic and cultural attraction (heritage); as reflected in the way and manner of processing, dishing and satiety value obtained at consumption of this brand of local rice. This result agrees with many studies such as Tomlins *et al.*, (2007); Demont *et al.*, (2012) and Naseem *et al.*, (2013), who opined that country of origin is an important credence attribute for rice consumption.

The coefficient of occupation (farming and artisan) is negative and statistically significant in influencing the consumption of local (ofada) rice. This implies that respondents that are farmers and artisans are less likely to consume local (ofada) rice. The possible explanation for this could be as a result of high price of local (ofada) rice which is due to the high cost of production as compared to imported rice. Another plausible reason could be that those who are farmers produce for commercial purposes and not for consumption. The result corroborates the study of Gyimah-Brempong, *et al.*, (2016), who asserted that local (ofada) rice is more expensive compared to imported rice. Lagos location coefficient is positive and statistically significant in influencing households' consumption of local (ofada) rice. This implies that Lagos State respondents consume more of local (ofada) rice than respondents in Ogun and Osun States. This may be as a result of availability of packaged local (ofada) rice in the supermarkets unlike other locations (in Ogun and Osun States) where most of consumers buy local (ofada) rice in the open markets.

Personal source of information coefficient is positive and statistically significant in influencing consumption of local (ofada) rice. This can be attributed to individual experience of local (ofada) rice being a nourishing food, with unique taste, pleasant aroma, well processed and packaged, free of foreign matters, now available in the market (ProPcom, 2009). In addition, information from the health care professional has positive coefficient and is statistically significant in influencing consumption of local (ofada) rice. This is an indication that the health care professionals are sensitizing people on the benefits of consuming local (ofada) rice and this tends to increase the consumption of the local rice brand (ofada). Empirical evidence suggests that advice provided by a nutritionist or health care professional can improve individuals' dietary behaviour and consumption (Loureiro and Nayga, 2007). Coefficients of family member and associate are statistically significant and negatively influence the consumption of local (ofada) rice. This means that information from family members and associate decrease the consumption of local (ofada) rice. The likely explanation could be because of harboured premonition that foreign materials are present in the local (ofada) rice variety.

Some variables that affect the dietary knowledge may have both direct and indirect effects on local (ofada) rice consumption. For instance, while being a household meal planner and presence of household member(s) on special diet do not have direct effect on households' consumption of local (ofada) rice, they have indirect effect by way of dietary knowledge. In addition, Ogun and Osun State locations do not have direct effect on households'

consumption of local (ofada) rice, but they do have indirect effect by way of dietary knowledge. Furthermore, gender has both direct and indirect (through dietary knowledge) effects on households' consumption of local (ofada) rice.

3.7 Conclusion and policy implications

The study examined the effect of households' dietary knowledge on local (ofada) rice consumption in south-west Nigeria. It was hypothesized in the study that dietary knowledge affects consumption of local (ofada) rice. The study revealed that dietary knowledge, as well as some socio-demographic variables have positive impact on households' consumption of local (ofada) rice, in south-west Nigeria. This shows that better dietary knowledge may increase consumption of local (ofada) rice if given proper attention. Moreover, increased consumption will help reduce prevalence and further complication of non-communicable diseases, since unpolished brown rice, local (ofada) rice contains mineral elements that help in reducing high risk of these diseases. Furthermore, consumption will lead to increase in local rice production, therefore reducing the level of importation and government expenditure on rice importation. In addition, the study recommends that appealing nutritional messages about local (ofada) rice variety be introduced through advertisements on different media such as radio, television and print media. In this respect, producers/manufacturers should be encouraged to imprint boldly the nutritional contents of local (ofada) rice on rice packages in a way that the consumers will understand. Also, government and stakeholders in the rice sector should stimulate availability and affordability of well packaged local (ofada) rice in the market across the region and Nigeria. In addition, an effective dietary education about health and other benefits of consuming local (ofada) rice be developed to promote its consumption in the diets of Nigerians.

CHAPTER 4

Households' Segment Identification and Their Perceptions of Local (Ofada) Rice Quality: Case of South-West, Nigeria.³

4.1 Introduction

In this chapter, the methodologies and the empirical findings on households' segment identification and their perceptions of local (ofada) rice quality are presented and discussed. The analytical framework and estimation techniques for identifying various household segments and their quality perceptions of local (ofada) rice are discussed. Finally, the empirical findings and the chapter summary are provided.

4.2 Rice quality attributes and consumer segmentation

4.2.1 Consumers' quality perceptions of local rice

Consumers' perceived quality attributes of local rice include physical appearance, cooking, and taste qualities of the rice. Appearance related traits including colour, grain length and shape (Ayinde *et al.*, 2013; Cranfield *et al.*, 2008) while cooking and taste relate to intrinsic cue. Perceptions of quality is a critical factor in consumers' foods choice (Gunnert 1997; Cranfield *et al.*, 2008). Weatheral *et al.*, (2003) report that top of mind issues when choosing local foods are intrinsic quality (taste, and freshness), health, environmental issues and origin. Similarly, Tregear and Ness, (2005) identify moral issues, health, image, convenience, origin, price and intrinsic quality in choosing local foods. Product quality is not an abstract concept. It is either built by the economic (product specification) or through public policy decision (i.e. minimum quality standard). According to Becut, (2011) consumers associate local rice with better taste, freshness, aroma, flavour, grain size, ease of cook, and attractive colour.

Chem and Li, (2006) opine that locally processed rice is perceived as possessing moderately severe risk and as an unknown risk, it should be processed in such a way that potential risk would be avoided. Evidence further suggests that individual behaviours are driven by perception or beliefs about risks (Zhang *et al.*, 2010). Consumers are optimistic about

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possible benefits of food, but they are also concerned with the associated health, safety and environmentally harmful consequences (Hossain *et al.*, 2013). The reciprocal influence among perceived quality of rice, perceived benefits and perceived risks of consuming local rice calls for examination. Therefore, consumers' preference studies identify taste as a significant cue that contributes to the consumption of domestic rice brand, although not the only critical factor in most cases (Lançon *et al.*, 2004; Konkobo *et al.*, 2002; Lançon and Benz 2007; Fall and Diagne 2008; Moseley *et al.*, 2010; Demont *et al.*, 2012). PrOpCom, (2007) and Omonona *et al.* (2011), in their different studies state that local (ofada) rice is preferred by consumers of all income classes for its distinct taste and aroma. However, obsolete and inefficient processing technologies were identified as the problems facing local (ofada) rice production (Omonona *et al.* 2011). Sowunmi *et al.*, (2014), opine that presence of foreign materials is a major problem perceived by consumers related to local (ofada) rice consumption.

4.2.2 Consumer segmentation

Consumer segmentation is viewing a market as several smaller units, i.e. dividing the market into a few segments. Theoretically, consumer wants are heterogeneous, leading to different product preferences. The purpose of market segmentation is observing the heterogeneous market as several smaller, more homogeneous segments which have internally similar product preferences and externally different product preferences. This allows producers to satisfy their customers' wants with more precision, in comparison with trying to satisfy the wants of the entire market. This means that by adjusting marketing effort to the requirements and wants of consumer groups, producers can secure product demand of the target market (Smith, 1956). This is referred to as differentiating or positioning the product, which is the benefit of the segmentation process (Borna & Chapman, 1993; Kotler & Keller, 2006; Smith, 1956).

Common segmentation bases include variables such as usage frequency (Twedt, 1967), brand loyalty (Boyd and Massy, 1972), usage situation (Dickson, 1982; Loudon and Della Bitta, 1993 in Wedel and Kamakura, 2000), demographic and socio-economic variables, e.g. geographical location, household/firm size, household/firm life cycle, age, gender and media usage (Blattberg, Peacock, and Sen, 1976; Wedel and Kamakura, 2000). In Nigeria, the term 'household' is preferred for market studies instead of 'family' because household encompasses both related and unrelated occupants of a housing unit (Ogidi *et al.* 2012). The

segmentation method of a market is expected to produce a number of different likely customer groups which is likely to evaluate the relative attractiveness of the market segment identified and select the target segments(s) that it will seek to serve for the enterprise (Crawford, 1997).

The local rice brands with their attributes are favoured by some Nigerians who are still attached to their traditional foods. If such people demand these local brands, then quality should be met, and also for consumers targeted through market segmentation. The intricacies involved in market segmentation are said to make it an exacting activity involving market-opportunity analysis, Marketing-mix determination and marketing strategy.

4.3. Research methods

In order to explore consumer perceptions of local (Ofada) rice quality, factor (exploratory and confirmatory) and cluster analyses were conducted.

4.3.1 Factor analysis

Factor analysis is the best known statistical procedure for investigating relations between sets of observed and latent variables (Byrne, 2005). In this approach to data analyses, there must be an examination of the covariation among a set of observed variables to gather information on underlying unobservable constructs (i.e., latent factors) (Zhang *et al.*, 2010). There are two basic types of factor analyses: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

Exploratory factor analysis

Exploratory Factor Analysis (EFA) is fundamentally used to reduce large number of variables to a smaller number of components. It is aimed at extracting maximum variance from the data set within each factor (Zhang *et al.*, 2010). EFA is commonly used when links between the observed variables and their underlying factors are unknown. It is exploratory in the sense that the researcher has no prior knowledge that the observed variables do indeed measure the intended factors (Byrne, 2005). Therefore, this study with a large sample size used Maximum Likelihood Extraction (MLE) method and Oblique Rotation Method options for EFA. An exploratory factor analysis was applied to 19 statements measured on a five-point Likert scale from “very important” to “not very important”. The appropriateness of the factor model was evaluated by Kaiser–Meyer–Olkin (KMO) test and the Bartlett test of Sphericity (Krystallis

et al., 2007). Five factors emerged from EFA with eigen values ≥ 1 and with factor loadings of at least 0.05 (Nunnally and Bernstein, 1994). The Bartlett test of Sphericity (Hair *et al.*, 1995) (Approx. Chi-square= 3713.331, df. 406, with p -value 0.0000) and the KMO measure of sampling adequacy with value of 0.786 confirmed that there was significant correlation among the variables to warrant the application of exploratory factor analysis.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) has the ability (and necessity) to test a specific model of factor structure. This allows for models in which not all variables are correlated with all factors. Furthermore, CFA provides researchers with the ability to correlate errors and test whether a specific model is equivalent across data from distinct groups. The study then performed a confirmatory factor analysis for the five factors from the EFA using STATA 13 package. The variable with higher factor loading in each factor influenced to a great extent the name assigned to represent a factor (Zhang *et al.*, 2010). Structural Equation Model (SEM) shows satisfactory fit with $\chi^2 [142] = 8083.01$ at p -value < 0.0001 .

4.3.2 Cluster analysis

Cluster analysis was used in this study to identify household segmentation and define them in clusters so that households in the same cluster were more similar to one another than they were to households in other clusters (Kornelis *et al.*, 2007; Zhang *et al.*, 2010). In the first stage of cluster analysis, Ward's cluster method was used to identify the number of clusters with a random sample of 600 respondents. The result of Ward's cluster procedure gives rise to three clusters. Accordingly, K-means cluster procedures were applied by taking the cluster seeds generated from the Ward's analysis as the initial cluster centres. Each case was assigned to the nearest of the three clusters using Euclidean distance. Therefore, household segment-specific patterns of local (ofada) rice quality perception was performed using SPSS 22.0. The five dimensions of local (ofada) rice perceived quality identified from factor analysis were used as clustering variables, since each factor is a linear combination of the items loading on it. Qualitatively, average value of < 2.5 were considered not important, values from 2.5-3.5 were considered neutral while average values above 3.5 were considered important. Ward's method was used to identify a range of potential solutions, then, a k-means cluster analysis was conducted for solutions with two to six clusters. The three-cluster solution was finally selected (Table 4.4).

4.3.3 The study area, sampling and data collection techniques

The data used in the analysis of this chapter is the same data set described in chapter three.

4.4 Results and discussion

4.4.1 Socio-demographic profile of the respondents for the study.

The socio-demographic characteristics of the sampled local (ofada) consumers' households are presented in Table 4.1.

Table 4.1: Demographic Profile of the respondents for the study

Age	≤ 30	31 – 40	41 – 50	>50
	22.0	39.8	30.2	8.0
Gender	Male	Female		
	52.0	48.0		
Educational Level	Informal	Primary	Secondary	Tertiary
	7.5	3.2	10.3	79.0
Household Size	< 4	4 – 6	7 – 9	
	54.8	38.2	7.0	
Number of Income Earner	1	2	3	4
	46.8	52.0	0.8	0.3
Income Categories of Consumers	low	Average	High	
	<₦ 50,000	₦50,000 – ₦100,000	> ₦ 100,000	
	19.2	42.7	38.2	
Marital Status	Married	Others		
	85.0	15.0		

Over 50 percent of the households are headed by a male, while more than half of the sample (70 percent) are within the age range of 31 to 50 years. This finding is consistent with the study of Krystallis *et al.*, (2007) who found that there is almost equal representation of gender and age group in household food purchase. About 85 percent are married, while 15 percent are single. Furthermore, 54.8 percent have a household size of less than five people, while 43.2 percent have more than five members. Over 50 percent of the participating households have two or more income earners, with 61.9 percent belonging to average to low income levels, and 79 percent of the households having tertiary education. This study is consistent with the Nigeria Bureau of Statistics (NBS) report, 2010 which authenticates the fact that majority of the respondents are civil servants, earning ₦18,000.00 minimum wage and above in the civil service.

4.4.2 Local (ofada) rice consumption pattern.

Households' local (ofada) rice consumption pattern based on perception, monthly expenditure, frequency of purchase and consumption is presented in Table 4.2.

Table 4.2: Perception, expenditure and frequency of purchase and consumption of local rice.

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
<i>Household local rice perceptions</i>					
It is easy to get local rice in the market	16.2	36.7	40.8	3.7	2.7
Local rice is not difficult to cook	9.8	64.5	0	23.0	2.7
Local rice is not expensive	36.5	29.2	13.5	18.2	2.7
Local rice is better for my health	16.2	7.2	30.3	34.5	11.8
Eating local rice is a sign of prosperity	15.2	3.0	9.2	68.8	3.8
It can be easily accompanied by many side dishes	6.3	19.5	36.8	34.7	2.7
It is suitable for social occasions	5.3	26.0	20.8	37.5	10.3
It tastes better than imported rice	2.7	3.8	20.0	49.7	23.8
<i>Frequency of and expenditure on local rice purchasing</i>					
Do you eat local rice?		<i>Yes</i>		<i>No</i>	
		91.3		8.7	
Where do you eat local rice?		<i>Home</i>		<i>Away from home</i>	
		78.3		21.7	
Frequency of eating local rice		<i>Often</i>		<i>Sometimes</i>	
		65.8		34.2	
Place of local rice purchase	<i>Own production</i>		<i>Stores</i>		<i>Open market</i>
	7.2		61.2		31.7
Monthly expenditure on local rice purchases	<i><5000</i>		<i>5000-10000</i>		<i>>10000</i>
	65.5		29.2		5.3

More than 90 percent of the households consume local (ofada) rice. Over 60 percent consume local (ofada) rice frequently, almost 80 percent of them consume local (ofada) rice at home and majority of the households (61.2 percent) indicate that they purchase local (ofada) rice from the stores. Almost 70 percent of the households spend less than ₦5000 Nigerian naira (\$13.9) on local (ofada) rice per month, 29.2 percent of them spend between ₦5000-₦10000 (\$13.9-\$27.8) and the rest, 5.3 percent expend over ₦10000 (\$27.8). In addition, more than half of the respondents (52.9 percent) disagree that local (ofada) rice is easy to get in the market, about three-quarters (74.3 percent) report that it is difficult to cook, while majority (65.7 percent) disagree that local (ofada) is not expensive.

In addition, 45.3 percent of the households agree that the rice variety is better for their health, almost three-quarter of the respondents agree that consumption of the rice showcases prosperity due to the fact that it is expensive and not readily available in the market. On whether local (ofada) rice can be easily accompanied by many side dishes, 36.8 percent of the households were neutral, while 37.4 percent were in total agreement. Majority of the respondents (73.5 percent) agree that local (ofada) rice tastes better than imported varieties while almost 50 percent of the respondents agree that local (ofada) rice is suitable for social occasions.

4.4.3 Analyses of attributes considered in quality perceptions of local (ofada) rice.

Table 4.3 shows the result of factor analysis conducted for 19 quality attributes considered for the study in evaluating rice consuming households' quality perceptions of local (ofada) rice.

Five factors (Table 4.3) were suggested by EFA and the variables measuring these factors were found to explain satisfactorily 77.24% of the total variances. The internal reliability of the five factors were all above the minimum value of 0.6 as postulated by Nunnally and Bernstein (1994) except for extrinsic factors, possibly due to existence of additional variables, which should be included in the imputed variables. Also, in order to test the value of the variables that were loaded into the factors, item-to-total correlation was set above 0.5 (Parasuraman, *et al.*, 1994). As a result, the factors were re-specified to determine their conceptual fitness based on these two basic rules. Thus, all nineteen variables became valid for exploratory factor analysis (Table 4.3).

A confirmatory factor analysis was performed for the factor pattern suggested by the exploratory analysis. Attributes such as nutrient level, level of impurities, aroma, expansion, and price were classified as indicators of the benefits factor (F1), while texture, freshness, ease of cooking, rate of breakage and perceived chemical storage were classified as indicators of experience factor (F2). Other attributes such as packaging, grain cohesion, taste, availability and attractiveness are classified as the search factor (F3). Furthermore, attributes such as grain size and swelling capacity are classified as indicators of the intrinsic traits factor (F4), while grain shape and colour attributes are classified as indicators of extrinsic quality factor (F5). The attributes with highest factor loading in each class influenced to a

great extent the name assigned to the class (Zhang *et al.*, 2010). Factor 1 was named benefit because the perceived nutrient level or nutritional benefit had the highest loading value.

Table 4.3: Factor analysis results of the nineteen initial local (ofada) rice quality variables, (n = 600)

Initial variables	Factors					Mean Score
	F1. Benefit	F2. Experience	F3. Search	F4. Intrinsic Trait	F5. Extrinsic Quality	
The most important attributes of Ofada rice is	Factor loadings					
Nutrient level	0.885					
Level of impurity	0.874					
Aroma	0.863					
Expansion rate	0.764					
Price	0.747					3.724
Texture		0.946				
Freshness		0.825				
Ease of cooking		0.815				
Rate of breakage		0.727				
Perceived chemical storage		0.468				2.849
Packaging			0.870			
Grain Cohesion			0.753			
Taste			0.616			
Availability			0.612			
Attractiveness			0.610			3.716
Grain size				0.869		
Swelling capacity				0.839		3.814
Grain Shape					0.891	
Colour					0.856	3.313
Factor statistics						
Cronbach α	0.9169	0.8438	0.8469	0.7539	0.3377	
Variance explained (%)	36.621	13.947	11.620	7.957	7.099	
Cumulative Variance explained (%)	36.621	50.567	62.187	70.144	77.242	
Eigen Value	6.958	2.650	2.208	1.512	1.349	

The second factor was named experience because texture which had the highest loading value was grouped under experience attributes according to Demont *et al.*, (2013). The variable,

packaging which had the highest loading value is an important search attribute, hence the name for the third factor. The last two factors were named intrinsic traits and extrinsic qualities because of the variables included in each factor. The final estimates are shown in Figure 4.1 (standardized solution).

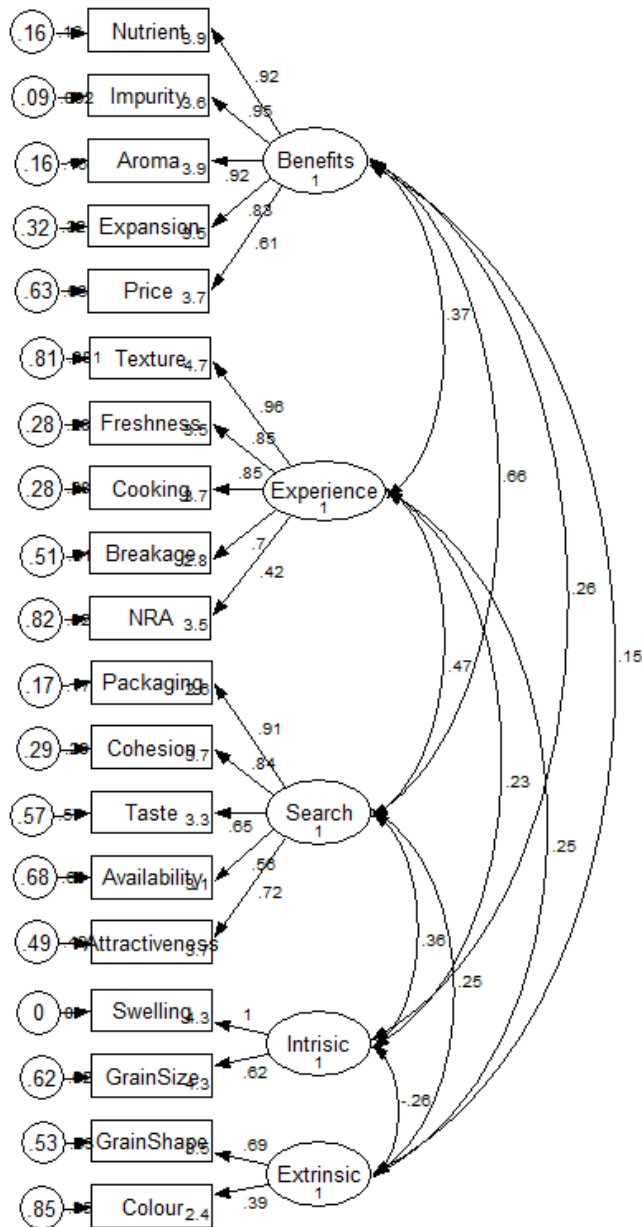


Figure 4.1: Confirmatory factor analysis model of household quality perceptions of local (Ofada) rice (Standardised estimates)

Source: Author, 2019

All benefits, search and intrinsic trait attributes have high correlations. Swelling capacity under intrinsic trait has correlation value of 1 which is the highest among all the attributes considered for the study. Perceived chemical storage (NRA) under experience factor and

colour (extrinsic quality) have the lowest correlation values of 0.42 and 0.39 respectively. This suggests that some important attributes might be missing under experience and extrinsic factors (figure. 4.1). Benefit factor correlates very well with search factor (0.66). This suggests that benefit factors are important to the consumers when making local (ofada) rice consumption decisions.

4.4.4 Households' segments identification and their quality perceptions of local (ofada) rice quality.

The importance assigned to the five factors based on the households' segmentation is shown in Table 4.4.

Table 4.4: Description of the three clusters in terms of importance assigned to the five factors of local (ofada) rice quality (n = 600, mean scores)

	Sig.	Consumer Clusters			Mean importance per factor
		C ₁ (43.2%)	C ₂ (25.2%)	C ₃ (31.6%)	
F1: Benefits	*	4.39	3.36	<i>3.04</i>	3.60
F2: Experience	*	4.03	2.74	3.37	3.38
F3: Search attributes	*	4.31	2.92	3.46	3.56
F4: Intrinsic Trait	*	4.43	3.24	3.30	3.66
F5: Extrinsic Quality	*	4.15	3.92	3.27	3.78
Mean importance per cluster		4.26	3.24	3.29	

*Statistically significant at $p < 0.001$ (ANOVA)

1 = Not important, 2 = Not very important, 3 = Neutral, 4 = Important, 5 = Very important.

Bold characters indicate highest values per cluster; characters in italics indicate lowest values per cluster

Cluster 1 is made of 259 households (43.2 percent of the total sample); cluster 2 comprised 159 households (25.2 percent); while 189 rice consumers' households which account for 31.6 percent made cluster 3. The clusters were significantly different from each other in terms of the importance attached to the five perceived quality factors.

Cluster 1 members rated all the five perceived quality groups as important in the following order: intrinsic traits, benefits factor, search factor, extrinsic quality and experience factors. This suggests that there has been some level of improvements (especially as it relates to level of impurity) in local (ofada) rice available in the market. This result is consistent with Osaretin *et al.*, (2007) and Ayinde *et al.*, (2013), who assert that local (ofada) rice is highly

nutritious and very attractive. Therefore, cluster 1 could be named ‘meticulous’ cluster. Total average agreement with the importance of the five factors for meticulous cluster was the highest of all the clusters with mean score of 4.26.

Households in cluster 2 assigned importance to only extrinsic quality out of five local (ofada) rice quality factors and are indifferent to all other factors, hence, cluster 2 is termed ‘extrinsic’. However, the overall agreement with the importance of five factors in extrinsic cluster is the lowest among the three clusters (mean score = 3.24). Cluster 3 households are indifferent in their judgement of all the five quality groups. Therefore, they are termed ‘casual’. On the other hand, the importance assigned to experience, search attributes and intrinsic traits is higher than that of cluster 2 while importance assigned to benefits and extrinsic is the lowest of all the clusters. The overall average agreement with the importance of all the factors (mean score = 3.29) is less than cluster 1 but greater than cluster 2.

The socio-demographic features of the clusters are also compared. The distribution of each socio-demographic feature across each cluster is shown in Table 4.5.

Table 4.5: Socio-demographic characteristics of the three clusters (n = 600, percent)

Socio-demographic	Meticulous cluster %	Extrinsic cluster %	Casual cluster %
Age***			
≤ 30	16.6	21.9	29.6
31-40	37.5	37.1	45.0
41-50	35.9	32.5	20.6
>50	10.0	8.6	4.8
Male	46.7	49.7	52.1
Female	53.3	50.3	47.9
Income per month***			
Low	22.8	19.9	13.7
Medium	37.5	45.0	47.9
High	39.8	35.1	38.4
Quantity purchase per months (Kg)***			
1-10	34.0	37.1	41.1
11-20	39.4	45.0	51.6
>20	26.6	17.9	7.4
Frequency of consumption***			
Often	57.9	62.3	77.4
Sometime	40.9	37.7	21.1
Never	1.2	0.0	1.6
Location***			
Lagos	54.4	31.8	5.8
Ogun	12.0	33.8	62.1
Osun	33.6	34.4	32.1

*** Statistically significant at $p = 0.001$ (χ^2 test)

The percentage of older respondents is highest in meticulous cluster (45.9 percent), followed by extrinsic cluster (41.1 percent), with casual cluster having the lowest percentage (25.4 percent). This suggests that age might affect the taste and preference of food consumed. The number of female headed households is highest in meticulous cluster (53.3 percent), followed by intrinsic cluster with 50.3 percent and casual cluster with the least (47.9 percent). Also, meticulous cluster has the highest percentage of high-income earners (39.8 percent), followed by casual cluster (38.4 percent), while extrinsic cluster records the least percentage (31.5 percent). In relation to quantity of local (ofada) rice consumed per month, meticulous cluster exhibits the highest percentage above 10 kilograms (66 percent) followed by extrinsic cluster (62.9 percent) and casual clusters with 59 percent. The percentage of households that purchase local (ofada) rice often is 57.9, 62.3 and 77.4 for meticulous, extrinsic and casual clusters respectively. Majority (54.4%) of the households in meticulous cluster are from Lagos State. Therefore, meticulous cluster might also be referred to as Lagos cluster. Most of the respondents (62.1%) of households in casual cluster are from Ogun State. Therefore, casual cluster might be called Ogun cluster. Extrinsic cluster on the other hand is evenly distributed across the three States, though the highest percentage of households is found in Osun State (34.4 percent).

The mean distribution of age, income and quantity of local (ofada) rice consumed for the three (3) clusters are presented in Table 4.6.

Table 4.6: Mean distribution of age, income and quantity consumed for the three clusters (n = 600, p = 0.05)

Variables	Meticulous cluster (259)	Extrinsic cluster (151)	Casual cluster (190)
Age			
Mean	40.4 ^a	38.8 ^b	35.8 ^c
Std. Error	0.59	0.78	0.63
Lower Bound 95% C.I	39.3	37.2	34.6
Upper Bound 95% C.I	41.6	40.3	37.1
Income			
Mean	111746.3 ^a	94190.2 ^b	81484.2 ^c
Std Error	4138.9	4898.8	3022.3
Lower Bound 95% C.I	103596	84510.7	75522.5
Upper Bound 95% C.I	119896.6	103869.7	87445.9
Quantity consumed per month			
Mean	5.9 ^a	5.4 ^b	4.5 ^c
Std Error	0.7	0.8	0.5
Lower Bound 95% C.I	16.2	14.7	12.7
Upper Bound 95% C.I	19.0	17.8	14.5

^{abc}Statistically significant at $p < 0.05$ (LSD)

The results show that there are significant differences in the age, income and quantity of local (ofada) rice consumed by the three clusters. The mean age, income and quantity of local (ofada) rice consumed in meticulous (cluster 1) are 40.4 years, ₦111746.3 (\$310.41) and 5.9kg respectively. Meticulous cluster (Cluster 1) is statistically different from both extrinsic cluster (cluster 2) and casual cluster (cluster 3). Cluster 1 has the highest percentage of older respondents, exhibits highest consumption of local (ofada) rice and values all the five perceived quality of local (ofada) rice. This is likely due to the fact that percentage of women in cluster 1 is the highest among the three clusters and women are known to be responsible for the well-being of their family by providing food with good nutritional quality which local (ofada) rice possesses (Ayinde, *et al.*, 2013 and Gyimah-Brempong *et al.*, 2016). Also, income is expected to be related to the purchasing power, which is probably responsible for the highest quantity of local (ofada) rice consumed by the members of cluster 1.

Cluster 2 mean age, income and quantity of local (ofada) rice consumed are 38.8 years, ₦94190.2 (\$261.64) and 5.4kg, respectively, and they are significantly different from cluster 3. Cluster 2 is similar to cluster 1 in terms of age of respondents, percentage of women but differs in the level of income which is probably responsible for the difference in the quantity of local (ofada) rice consumed. Cluster 2 members are spread across the three States.

Cluster 3 is the least in terms of age, income and quantity of local (ofada) rice consumed with the mean distribution of 35.8 years, ₦81484.2 (\$226.35) and 4.5kg, respectively. In comparison to the other two clusters, cluster 3 comprises the largest percentage of middle-aged consumers and exhibits the lowest consumption of local (ofada) rice. The indifferent attitudes towards the perceived quality of local (ofada) rice maybe responsible for its low consumption. Another reason could be the factor of location, since many of the respondents reside in Ogun State. These respondents probably major in production instead of consumption, as Ogun State is the origin of local (ofada) rice and also known for being the highest in terms of production (Danbaba *et al.*, 2011 and Ologbon *et al.*, 2012).

Finally, in line with the objective of the study, estimation of differences among the three clusters as related to local (ofada) rice consumption merits special emphasis. Marketing-mix determination which involves developing and implementing a strategy for delivering an effective combination of want-satisfying features to consumers will be an effective strategy for marketers within target markets. The marketing-mix is made up of four components: product, price, promotion and place. It is obvious that different consumer households

segments have different concerns and interests toward local (ofada) rice consumption as reflected from the responses of local (ofada) rice consumers' households considered for the study.

4.5 Conclusion and policy recommendations

It is expedient for policymakers as well as the private sector in Nigeria's rice value chain to understand Nigerian households better. This study identifies the different subgroups of local (ofada) rice consumers' households in terms of their quality perceptions and establishes the importance of some of the attributes of local (ofada) rice considered. Factor analysis shows that households in the study area valued virtually all the local (ofada) rice attributes. Standardised estimates for confirmatory factor analysis revealed that attributes under benefits, search and intrinsic factors correlate well while some important attributes are missing under experience and extrinsic factors, which are probably not included in this study. Also, benefit factor highly correlates with search factor (0.66). Furthermore, the study segmented households based on the identified factors from factor analysis. The study identified three clusters of local (ofada) rice consumers' households and each segment (cluster) has different concerns and interests towards local (ofada) rice variety. Cluster 1 considered all the attributes of local (ofada) rice variety as important and was named meticulous cluster. Cluster 2 valued physical appearance of the local (ofada) rice and was named extrinsic cluster. Cluster 3 was named casual cluster because it was neutral to all the attributes considered for quality perceptions of local (ofada) rice, indicating a type of ethnocentric behaviour of the consumers.

Thus, different technologies and market strategies are needed to target different consumer household groups. This will assist Nigeria in improving her local rice brands to meet consumers' demand locally and internationally. Based on this, more attention should be given to the needs of consumers as regards local (ofada) rice to enable it to compete favourably with imported ones and increase its acceptability among consumers both locally and internationally. The substantial findings from this study is that, well processed and packaged local (ofada) rice is largely available among meticulous clusters with its highest percentage in Lagos State as revealed from the responses of local (ofada) rice consumers' households from that location. Thus, this study suggests a marketing-mix determination which involves developing and implementing a strategy for delivering an effective combination of want-satisfying features to consumers within target market for local (ofada) rice as the aim is to make the variety available across the country. Marketers should encourage their firms to

produce local (ofada) rice brands appropriating consumers preferred quality attributes that would maintain high quality and adhere to international standards. This will enable it to meet the tastes and preferences of consumers both within and outside Nigeria since consumers of local (ofada) rice extend beyond Nigeria. Lastly, promotions and adverts on local (ofada) rice should be configured to fit the various household segments so that the hope of purchasing and not just hoping-for-an-item will be reduced.

CHAPTER 5

Households' Acceptability of Local (Ofada) Rice Based on Quality Attributes in South-West Nigeria⁴

5.1 Introduction

Consumer valuation of rice attributes is of great importance to the rice value chain and actors involved in production, processing and marketing. In this chapter, the methodologies and the empirical results on households' acceptability of local (ofada) rice based on quality attributes are presented and discussed. The rest of the chapter is structured as follows: Section 5.2 presents the consumers' quality perceptions, which constitutes the conceptual framework, econometric techniques, data, sampling technique, description of variables, and empirical results and discussion. Section 5.3 presents the study area and method of data collection. Section 5.4 gives the definition of variables included in the model. Section 5.5 presents model specification. The empirical results and discussions are presented in section 5.6, while section 5.7 concludes the chapter with a summary of the results as well as recommendation.

5.2. Consumers' demand for product and evidence from empirical studies

The primary assumptions of the consumer demand model as stated by Ladd and Suvannunt (1976) is that under perfect competition, consumers have complete information about the quality characteristics of goods. This hypothesis holds especially, among food commodity markets with many buyers and sellers. The major premise, upon which "consumer's choice set" under perfect competition operates, holds if it includes all possible alternatives (finite in nature) along with mutual exclusiveness. However, in rural agricultural markets with no regulations and standards (existence of weak, incomplete or missing markets), the consumers may not reflect their choices based on perfect market equilibrium conditions (de Janvry and Sadoulet, 2009). Often the price denoted in these imperfect markets could be derived from their shadow prices. In other words, the price of the commodity in question is indirectly determined through their choice attributes, which would be reflected as premium price

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associated with the attributes. Thus, this would reflect the choice set or the preferences of the consumer involved.

Lancaster (1966) opined that the consumer demand theory emphasizes that the good (product) *per se* does not give utility to the consumer, but it possesses characteristics from which the consumer derives utility. Product characteristics explain why consumers prefer certain products to others in the same category. For instance, rice growers and traders (exporters) usually establish certain criteria to grade their commodities. Grading is based on key physical properties, that is consumption qualities and credence attributes. Physical quality comprises of the length of the grain, grain colour/whiteness, percentage of broken grains, moisture level and presence of foreign matter among others. While, cooking quality consists of aroma, taste, and stickiness; credence characteristics (fair trade practices) include the use of pesticides in production, organic food compared to conventional food and country of origin (Mhlanga, 2010). Though consumers may easily identify physical characteristics, it is not possible for them to determine the chemical characteristics; thus consumers have to rely on proxies such as brand name and place of origin to represent unobserved characteristics (Siddiq, *et al.*, 2012). Therefore, it should be noted that each rice variety available in the market has a distinct aroma and flavour characteristics that are determined partially either by genetics or post-harvest handling practices.

Furthermore, to precisely describe and interpret measures of quality characteristics, it is necessary to understand the role of genetics and other factors that determine quality. For example, grain colour (whiteness) is based on the degree of milling, whereas grain size is a function of rice variety. Hence, to understand households' acceptability of local (Ofada) rice, a hedonic model based on quality attributes is estimated empirically. The major assumption here is that consumers value local (Ofada) rice based on its desirable attributes, and derive maximum utility as a result. Dalton (2004) in his attempt to characterize attributes based on hedonic pricing model, advocates for the inclusion of both consumption and production characteristics to obtain a holistic understanding of consumer behaviour. In hedonic pricing, implicit prices are estimated by the stepwise regression analysis where product price is regressed on characteristics of the good, using Ordinary Least Squares method (Obih and Baiyegunhi, 2017). The present study adopts this method and relates the probability of consumers' attributes ranking to the attributes of the rice variety.

Many studies have been carried out to investigate the relationship between product quality attributes and prices of different food products. Grunert (2005) classified food quality attributes into four groups namely: sensory attributes (taste, smell, appearance), health attributes (nutritional benefits), process attributes (organic against Genetically Modified Organism) and convenience attributes (time and energy saving). Anang, *et al.*, (2011), used Kendall's coefficient of concordance and found that rice attributes such as taste, cooking quality, cooking time and aroma are the most preferred attributes by consumers in Tamale metropolis in Ghana. Fiamohe, *et al.*, (2013) using a choice modelling approach showed that the surveyed consumers in Togo were willing to pay more for rice free of dirt and whiteness of the grain. Demont, *et al.*, (2012), employed Vickery second price auctions to associate consumer willingness to pay for local Senegal rice and Thai rice, and found that consumers were willing to pay more for local rice than imported rice which is influenced by taste.

Hedonic models have been used to derive implicit values of product characteristics including rice, cotton, wool, wheat, grapes, wine, pork, tomatoes, vegetables and beef, among others. Apart from hedonic models, techniques such as conjoint analysis and choice models have also been used to examine consumer preference for food products. In the first known application of hedonic pricing to agricultural products, Waugh (1929) collected data on the prices of vegetables to explain the determinants of the price differences for the average price of a bundle of vegetables and discovered that price of vegetables was correlated with the length, and consumers placed more importance on the length (height) of vegetables. Gao, Ito, Ogundari and Saito (2016), estimated a hedonic function for the Japan rice market, and stated that consumers pay a premium for domestically certified pesticide and fertilizer free rice in comparison with imported rice. Similarly, Schnettler, *et al.*, (2009), opined that consumers use country of origin of a product as an attribute related to its quality using a hedonic function.

Tomlins, *et al.*, (2005) investigated consumer preferences and acceptability of domestic and imported rice in Ghana and found that consumers prefer imported raw and parboiled rice to domestic rice, and that acceptability was influenced by location and gender. Rutsaert, *et al.*, (2009) used Vickery second price auctions to compare consumer willingness to pay for Senegal rice and Thai rice and found that consumers were willing to pay up to 80% more for local rice than imported rice because of its taste. Mishili and Fulton, (2007) studied consumer preference for cowpea grain quality characteristics in West and Central Africa and found out that consumers pay a premium for large cowpea grains and discount for damaged grains.

Obih and Baiyegunhi (2017), used hedonic price model to estimate implicit prices consumers are willing to pay based on rice quality attributes in Nigeria and found that high swelling capacity, whiter colour, neatness, aroma and long shape were the most preferred attributes by consumers in the study area. Dalton (2004) derives a hedonic model formulation based on the model of the agricultural household, the tests for the statistical relevance of consumption attributes was done using experimental data and submits that rice breeders should consider post-harvest attributes in addition to production traits.

5.3. The study area, sampling procedure and data collection

The data used in the analysis of this chapter is the same data set described in chapter three.

5.4. Explanatory variables included in the hedonic model

In line with the studies of Jordan *et al.*, (1985), Goodwin *et al.*, (1996), and Obih and Baiyegunhi (2017), this study identified fourteen (14) quality cues of local (ofada) rice (Table 5.1).

Table 5.1: Definition for minimum and maximum value of local (ofada) rice attributes used in the hedonic model.

<i>Quality Attributes</i>	<i>Value = 1</i>	<i>Value = 14</i>
Colour	Light brown; Very desirable	Very brown; not desirable
Grain Shape	Short and fat; desirable	Long and slender; not desirable
Impurities	Very neat; desirable	Very dirty; not desirable
Rate of Breakage	None; desirable	Much; not desirable
Ease of cooking	Ease to cook; desirable	Difficult to cook; not desirable
Grain cohesion	Well separated; desirable	Poorly separated; not desirable
Grain size	Short; desirable	Long; not desirable
Swelling capacity	Very high; desirable	Very low; not desirable
Taste	Tasty; desirable	Tasteless; not desirable
Aroma	Very aromatic; desirable	No aroma; not desirable
Texture	Hard and desirable	Soft and desirable
Perceived Nutrient level	High; desirable	Low; not desirable
Perceived Freshness	High; desirable	Low; not desirable
Perceived chemical storage	Low; desirable	High; not desirable

Note: Quality attribute values were ranked on a Likert scale of 1 to 14 in a way that no two or more quality attributes were ranked equally.

5.5. Model specifications

5.5.1. Households' preference ranking of local (ofada) rice quality attributes

Fourteen quality attributes of local (Ofada) rice which include: colour, swelling capacity, grain shape, aroma, impurity, taste, grain size, grain cohesion, the rate of breakage, ease of cooking, texture, perceived nutrient level, perceived freshness, and perceived chemical storage were used in this study. Each household respondent was asked to rank all the fourteen quality attributes on a scale of 1 (most desired attribute) to 14 (least desired attribute) such that no two attributes are ranked equally. Kendall method of direct ranking was chosen in order to reduce the effect of multicollinearity among variables and to avoid dummy variable trap that could arise when too many dummy variables describe a given number of groups (Mhlanga, 2010). Kendall's concordance test was done to confirm the degree of agreement among respondents in their rankings of the rice quality attributes. This confirmation is imperative because hedonic price modelling of quality attributes of a good often makes use of respondents' rankings. The total rank score computed is then used to calculate the coefficient of concordance (W) as shown in equation (5.1).

$$W = \left[\frac{12 \left[\sum T^2 - \frac{(T)^2}{n} \right]}{nm^2(n^2 - 1)} \right] \quad (5.1)$$

Where:

W = Coefficient of concordance

T = Sum of ranks of the 14 local (ofada) rice quality attributes ranked in order of Preference.

m = Number of rice-consuming households interviewed

n = Number of local (ofada) rice quality attributes ranked

The coefficient of concordance (W) was tested for significance in terms of the F-distribution.

The F-ratio is given by equation (5.2):

$$F_{cal} = \frac{(m-1) * W}{1 - W} \quad (5.2)$$

The numerator and denominator degrees of freedom for equation (2) is:

$$(n-1) - \frac{2}{m} \quad (5.3)$$

and

$$m - 1 \left[(n-1) - \frac{2}{m} \right] \quad (5.4)$$

The primary aim of getting F-ratio is to test the null hypothesis that the respondent did not significantly agree on their preference rankings of the local (ofada) rice quality attributes.

5.5.2 Estimation of hedonic price function

For the proper understanding of consumer behaviour, evaluation of consumers' choices of product characteristics is considered important. This should include production and consumption attributes and other related factors (Mhlanga, 2010). To achieve this, the rice choices of households were mapped by estimating households' willingness to pay an implicit price based on the unique attributes of local (Ofada) rice variety using a simple hedonic function analysis.

Following Naseem, *et al.*, (2013), this study examines the relationship between implicit prices paid by consumers based on key rice consumption attributes, as observed in the market. This helped to evaluate the economic value of the attributes in question. The conceptual model for further empirical estimation was formulated based on Griliches (1971) framework, relating the price of the product to its quality characteristics. It is assumed that a linear functional relationship exists between rice price and its vector of attributes. The reduced form of the hedonic price function for empirical estimation is expressed as;

$$P_r = \sum_{i=1}^{11} \beta_{ir} x_{ir} + \varepsilon \quad (5.5)$$

This equation can be re-written as follows with each x representing each of the fourteen rice attributes;

$$P_r = \alpha + \beta x_{1r} + \beta x_{2r} + \dots + \beta x_{14r} + \varepsilon \quad (5.6)$$

Where P_r is observed market price of rice and ε the stochastic error term P_r , the dependent variable will vary for the different rice characteristics. The independent variables x_{ir} would

explain variance in the rice price and the parameter β_{ir} gives the implicit value of rice grain characteristics.

It should be noted that the hedonic price function is neither a demand nor a supply function but only expresses implicit product price (Rosen, 1974). Ratchford (1979) states that there is no *a priori* rule about the inclusion of quality characteristics, but quality characteristics should be observable and economically relevant to consumers. While it is important to include all attributes into the model, care must be taken to identify correlation within attributes as multicollinearity among variables inflates the standard errors.

5.5.3 Households marginal implicit price for local (ofada) rice.

As proposed by Ladd and Suvannunt (1976), the amount spent by a rice consuming household is the addition of the marginal monetary values of the variety quality attributes, for every rice variety consumed. The marginal monetary value of each quality attribute equals the quantity of the quality attribute obtained from the marginal unit of the rice variety consumed multiplied by the Marginal Implicit Price (MIP) of the quality attribute. Hence, MIP_{ij} for each j^{th} quality attribute of local (Ofada) rice equals the product of its mean market price \bar{P}_i and marginal yield of j^{th} quality attribute (β_j) divided by the mean quantity of the j^{th} quality attribute \bar{j} . The linear form of the hedonic model was used in this study and the MIP of the ith quality attribute for jth variety was estimated using equation (7). Therefore, the statements above can be expressed mathematically as:

$$MIP_{ij} = \frac{\beta_j \bar{P}_i}{\bar{j}} \quad (5.7)$$

5.6. Results and discussion

This section provides the estimates of the consumer's values of local (ofada) rice quality attributes (mostly consumption based). Specifically, it examines the relationship between price and rice quality attributes. The economic value of a good is revealed by the consumer's willingness to pay for the good.

5.6.1 Households' preference ranking of local (ofada) rice quality attributes.

The ranking of the 14 quality attributes of local (Ofada) rice variety in order of preference by households is presented in Table 5.2. Kendall concordance coefficient (W) is 0.7374, significant at 1% alpha level, implying that there is about 74% agreement in the ranking of

local (Ofada) rice quality attributes among households sampled for the study. This indicates a strong ranking of this rice variety's (Ofada rice) quality attributes by preference among households surveyed.

Table 5.2: Households' preference ranking of quality attributes of local (ofada) rice

Quality Attributes	Preference Rank (1 = Most preferred; 14 = Least preferred)														Mean Rank	Std. Dev	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14			
Colour	336 (56)	264 (44)	-	-	-	-	-	-	-	-	-	-	-	-	1.56	0.497	
Grain Shape	-	-	112 (18)	245 (41)	-	108 (18)	-	135 (23)	-	-	-	-	-	-	5.53	1.756	
Impurities	-	-	-	112 (18)	-	260 (43)	135 (23)	-	-	93 (16)	-	-	-	-	6.04	1.972	
Rate of Breakage	-	-	-	-	245 (40)	220 (37)	-	-	135 (23)	-	-	-	-	-	5.86	1.909	
Ease of cooking	-	-	-	-	93 (16)	-	135 (23)	-	108 (18)	112 (18)	-	-	-	-	7.64	1.760	
Grain cohesion	-	-	-	-	-	-	135 (16)	-	260 (43)	135 (23)	112 (18)	-	-	-	8.73	1.624	
Grain size	-	-	-	-	-	-	108 (18)	205 (34)	152 (25)	-	135 (23)	-	-	-	8.59	1.510	
Swelling capacity	-	-	-	-	-	-	-	93 (16)	-	152 (25)	-	247 (41)	108 (18)	-	11.05	1.668	
Taste	-	152 (25)	336 (56)	-	112 (18)	-	-	-	-	-	-	-	-	-	3.12	0.994	
Aroma	-	-	-	-	-	-	-	-	-	-	-	245 (41)	-	247 (41)	108 (18)	11.64	1.190
Texture	-	-	-	135 (22)	-	-	-	-	-	201 (35)	-	152 (25)	-	112 (18)	10.12	3.903	
Perceived Nutrient level	112 (19)	336 (56)	152 (25)	-	-	-	-	-	-	-	-	-	-	-	1.69	0.849	
Perceived Freshness	-	-	-	-	-	-	-	-	-	-	-	108 (18)	93 (16)	152 (25)	247 (41)	12.9	1.131
Perceived chemical storage	-	-	-	-	135 (23)	-	-	-	-	112 (18)	-	-	108 (18)	93 (16)	152 (25)	10.53	3.424

Note: figures in parenthesis are number of household respondents in percentage.

From the result in Table 5.2, about 56% of households ranked colour as the most preferred quality attributes of local (Ofada) rice, 19% ranked perceived nutrient level as the second most preferred attribute, followed by taste (56%), grain shape (41%), and rate of breakage (40%) as the first to fifth most preferred attributes of local (Ofada) rice, respectively. The Mean Attribute Ranking Scores (MARS) of these attributes are 1.56, 1.69, 3.12, 5.53, and 5.86, respectively (Table 5.2). The less preferred quality attributes of local (Ofada) rice based on households' preference ranking are perceived freshness, aroma and swelling capacity. The preference ranking of this study is consistent with the findings of Abansi, *et al.*, (1992), Dalton, (2004), Demont, *et al.*, (2012), and Sudha, *et al.*, (2013).

5.6.2 The hedonic model of the effects of quality attributes on retail prices of local (ofada) rice.

The hedonic model results of the effects of quality attributes on the retail (market) price of local (Ofada) rice is presented in Table 5.3. The R^2 value of 0.639 shows that the variables included in the model explained 64% of the reasons why households in the study area consume local (Ofada) rice. The result of Variance Inflation Factor (VIF) shows that there is no problem of collinearity in the model. The overall VIF value for variables imputed in the model (2.5) was not up to 10 (Table 5.3) (Mhlanga, 2010).

Table 5.3: Parameter estimates of the effects of quality attributes on the price of local (ofada) rice.

Attributes	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t-value	P> t
Colour	13.340	1.016	0.636	13.13	0.000***
Grain Shape	3.972	1.386	0.188	2.86	0.004***
Impurities	0.399	0.796	0.018	0.50	0.616
Rate of Breakage	-3.687	0.698	-0.173	-5.28	0.000***
Ease of cooking	-1.423	1.267	-0.067	-1.12	0.262
Grain cohesion	10.308	0.736	0.405	14.01	0.000***
Grain size	-1.391	0.971	-0.053	-1.43	0.152
Swelling capacity	-1.623	0.913	-0.054	-1.78	0.076*
Taste	-0.681	0.902	-0.021	-0.76	0.450
Aroma	0.846	1.009	0.022	0.84	0.402
Texture	-11.972	0.811	-0.542	-14.77	0.000***
Perceived Nutrient level	2.706	0.605	0.129	4.47	0.000***
Perceived Freshness	-4.252	0.968	-0.153	-4.39	0.000***
Perceived chemical storage	6.358	0.714	0.295	8.90	0.000***
Constant	832.450	1.623		512.88	0.000
R^2	0.639				
<i>Std. Err. of Estimate</i>	152.610				
<i>Durbin Watson</i>	1.670				
<i>F (14, 585)</i>	73.900				
<i>p-value</i>	0.000				
<i>VIF</i>	2.520				

* Denotes level of significance at 10%; and *** at 1%

5.6.3 Estimated marginal implicit prices of rice quality attributes

Marginal Implicit Prices (MIPs) for quality attributes of local (Ofada) rice were presented in Table 5.4. Using the estimated standardized coefficients in Table 5.3., the estimated MIPs indicate that the MIPs vary widely from one state to another as a result of differences in the market prices and consumers' preference for rice attributes. Local (Ofada) rice consuming

households paid an average price of ₦308.05 (\$0.86) per kg for the quality attributes of local (Ofada) rice variety consumed. Overall, quality attributes account for about 41% of the amount spent by households on local (Ofada) rice variety. The result agrees with Obih and Baiyegunhi (2017) that rice consumers in Nigeria value quality attributes than the rest of African countries which is about 34% (Demont, *et al.*, 2012).

The Marginal Implicit Prices (MIPs) was estimated per kilogram because of the packaging system of the local (Ofada) rice (Table 5.4). The packaging is usually done in series of 1kg, 2kg, 5kg, 10kg and 25kg. It is assumed that some households may not be consuming in large quantity, hence, this informed the choice of standardization in kilogram.

Table 5.4: MIPs of quality attributes of local (ofada) rice across locations (in percentages).

Attributes	South-West	MIP to Mean Price	Lagos	MIP to Mean Price	Ogun	MIP to Mean Price	Osun	MIP to Mean Price
Colour	71.03	23.06	79.05	24.27	7.96	5.45	48.54	14.08
Grain Shape	21.06	6.84	9.84	3.02	4.90	3.36	3.32	0.96
Impurities	2.05	0.67	2.37	0.73	1.01	0.69	9.69	2.81
Rate of Breakage	19.36	6.28	8.82	2.71	0.94	0.64	4.60	1.33
Ease of cooking	7.53	2.44	9.75	2.99	7.65	5.24	3.18	0.92
Grain cohesion	45.23	14.68	44.93	13.79	82.30	56.37	48.83	14.17
Grain size Swelling capacity	5.89	1.91	14.87	4.56	17.45	11.96	7.99	2.32
Taste	6.00	1.95	0.12	0.04	5.15	3.53	5.40	1.57
Aroma	2.39	0.77	0.95	0.29	0.38	0.26	0.96	0.28
Texture	2.42	0.79	4.37	1.34	2.17	1.49	4.72	1.37
Perceived Nutrient level	60.55	19.66	65.58	20.13	1.70	1.16	56.55	16.41
Perceived Freshness	14.41	4.68	21.62	6.64	6.08	4.16	52.38	15.20
Perceived Xcal. storage	17.14	5.57	15.42	4.73	4.74	3.25	22.21	6.44
Mean Price	32.98	10.71	48.06	14.75	3.57	2.44	76.30	22.14
	308.05		325.76		145.98		344.67	

Note: Estimation of MIPs were done in Naira in relation to the price per kg of local (Ofada) rice consumed. 2017 currency conversion rate 1\$= ₦360,

Light brown grain of local (Ofada) rice is the quality attribute valued most by the households in the study area, and they are willing to pay MIP of ₦71.03 (\$0.20) per kg. The result agrees with the study of Obih and Baiyegunhi (2017) who stated that grain colour is one of the most valued attributes of rice. Nutrients that are beneficial to health are high in partially milled brown rice (Roy, *et al.*, 2008). The consumers in the study area tend to prefer partially milled local (Ofada) rice and thus willing to spend more because of its colour. A conceivable reason

could be that households in the study area may have been adequately informed, and hence, aware of the nutritional implications of unpolished rice grains, which are highly rich in vitamins and minerals. The study disagrees with earlier studies of Demont, *et al.*, (2012) and Sudha, *et al.*, (2013) that consumers are not aware of nutritional and health issues connected with unpolished (brown) rice.

Another quality attribute influencing the price paid by households is the texture of the grain. Hard texture of the grain strongly influences price paid by households because of its economic implication (Obih and Baiyegunhi 2017). Rice consuming households in the study area discount MIP of ₦60.55 (\$0.17) per every kilogram of local (Ofada) rice for hard texture of the grain. A possible explanation could be that poor processing technology adopted by the processors could not effectively remove the hard surface (bran) of the grain. This agrees with the result of IRRI, (2015) that in the Philippines, hard grain texture influences the price consumers of brown rice are willing to pay. In addition, Diako, *et al.*, (2010) also asserted that grain texture is one of the major factors affecting consumers' willingness not to pay premium for domestic rice. The results across locations suggest that households in Lagos and Osun States discount more, ₦65.58 (\$0.18) and ₦56.55 (\$0.16) respectively, on grain texture of local (Ofada) rice than households in Ogun State (₦1.70) (\$0.005).

Grain cohesion is another attribute that influences local (Ofada) rice consumption in the study area. Separation of rice grains (Grain cohesion) is an important factor affecting households' rice purchasing preference. Rice grains that are not sticky when cooked would always be the choice of households. For every one kilogram of local (Ofada) rice, consumers are willing to pay an implicit price of ₦45.23 (\$0.13) for after-cook grains that are non-sticky. This result agrees with the findings of Abansi, Lantican, Duff and Catedral, (1992), Butt, Anjum, Rehman, Nadeem, Sharif and Anwer, 2008 and Obih and Baiyegunhi (2017) who stated that grain cohesion is one of the important attributes influencing households' purchasing decision of rice and willingness to pay premium for rice varieties with non-sticky grains after cooking. Local (Ofada) rice has low amylose content which could be responsible for its high level of grain separateness. Amylose content reduces with longer storage period of rice (Butt, *et al.*, 2008). It could also suggest that local (Ofada) rice variety is stored for long before being taken to the market and this enhances preparation and serving quality. Out of the three states considered for the study, Ogun residents have the highest MIP (₦82.30) (\$0.23), followed by Osun (₦48.83) (\$0.14) and Lagos with the least MIP (₦44.93) (\$0.12) for local (Ofada) rice grain cohesion.

Grain shape is also an important quality attribute that influences households purchasing decision of local (Ofada) rice in the study area. The coefficient of grain shape positively influences the price paid and consumers were willing to pay MIP of ₦21.06 (\$0.06) per kilogram for this attribute. This means that consumers in the study area prefer the short and fat shape of local (Ofada) rice. The likely reason for this could be the indigenous attachment of people in the study to this rice variety. As posited by Cuevas, *et al.*, (2016), rice consuming households in the Philippines prefer the short, and bold shape grain of their own traditional upland rice varieties and are willing to pay premium for this attribute.

The coefficients of perceived nutrient level and perceived chemical storage are positive and significantly influence the price paid by consumers for local (Ofada) rice. Households in the study area were willing to pay MIPs of ₦14.41 (\$0.04) and ₦32.98 (\$0.09) for perceived nutrient level and perceived chemical storage, respectively for every kilogram of local (Ofada) rice. Perceived nutrient content and perceived chemical storage exert strong influence on taste and cooking qualities of rice and price is expected to be positively related to these attributes. This result is in line with the study of Gao, *et al.*, (2016), who stated that consumers in Japan pay a premium for domestically certified, pesticide and fertilizer free rice in comparison with imported rice. This may imply that households in the study area understand that local (Ofada) rice is cultivated without chemicals (Danbaba, *et al.*, 2016) and are aware of the nutritional implications of unpolished rice grains, which are highly rich in vitamins and minerals, hence, nutrients that are beneficial to health are found to be high in brown rice (Roy, *et al.*, 2008; Verma and Srivasta, 2017).

Coefficient of rate of breakage of local (Ofada) rice negatively influences the price paid by consuming households in the study area and were willing to discount an implicit value (MIP) of ₦19.36 (\$0.05). This study agrees with Danbaba, *et al.*, (2014) and Danbaba, *et al.*, (2016), who in their separate studies found that high rate of broken grains of Nigeria's local rice caused consumers to discount price. According to Diako, *et al.*, (2010), the level of broken grains is importantly used by consumers in grading rice. The possible explanation could be as a result of traditional processing technologies such as mortar and pestle, employed by majority of processors to dehusk rice bran which enhances grain breakage. Roy, *et al.*, (2011), asserted that use of traditional milling methods to remove the rice bran leads to greater grain breakage.

Swelling capacity has economic consequence and influences consumers' purchasing decisions (Anang, *et al.*, 2011). Households in the study area discount MIP of ₦6.00 (\$0.02) for low swelling capacity of local (Ofada) rice. This result is unexpected. The lower content of amylose is expected to enhance swelling capacity of the rice but the reverse is the case for local (Ofada) rice. The likely reason for lower swelling capacity of the local (Ofada) rice could be attributed to water absorption as a result of prolonged soaking of the kernel in water as a process of reducing its aromatic smell before cooking (Anuonye, *et al.*, 2016; Danbaba, *et al.*, 2016).

5.7. Conclusion and policy recommendation

The economic value of a good is revealed by the consumer's willingness to pay for the good. This study, estimated consumer's acceptability of local (Ofada) rice based on quality attributes. The study showed that rice consumers' households in the study area considered product attributes such as physical appearance and cooking quality when making purchasing decision, as quality attributes contribute about 41% of prices paid by local (Ofada) rice consumers' households. Quality attributes such as light brown after-cook colour, grain shape, perceived nutrient level and perceived chemical storage influence market price of local (Ofada) rice and consumers would pay premiums of ₦71.03, ₦21.06, ₦14.41 and ₦32.98 respectively for these quality attributes. This study, therefore, recommends that modern rice processing and polishing that incorporate traditional technology is required to improve both extrinsic and intrinsic qualities (such as swelling capacity, rate of breakage, texture etc.) of local (Ofada) rice to enhance consumers' households acceptability, affordability and competitiveness. Consequently, this would increase production through consumers' acceptability, thus making local (Ofada) rice gain good market share against imported brands whilst improving living standard of farmers, and processors through increased earnings.

CHAPTER 6

Prototyping Local (Ofada) Rice Consumers in South-West Nigeria: Misalignment Implications for Satisfaction and Loyalty⁵

6.1 Introduction

This chapter presents and discusses the empirical findings on prototyping local (ofada) rice consumers in south-west Nigeria: misalignment implications for satisfaction and loyalty. The rest of the chapter is organized as follows: Section 6.2 discusses the conceptual framework and estimation techniques used in achieving the objectives of the chapter. Section 6.3 presents the methodology adopted for the study. The empirical results and discussions are presented in section 6.4. Finally, summary of the chapter is presented in section 6.5.

6.2 Conceptual framework

Following Teng and Wang, (2015), this study is built on the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB). Both TRA and TPB postulate that individual behavioural intentions depend on, among many other factors, attitudes toward the behaviour. These theories assumed that individual decision-making is rational, which points to the importance of reasoning attitudes in predicting behaviour (Ajzen and Fishbein, 1980). The fundamental reasoning and behaviour of prototype local (ofada) rice consumer are based on health benefits (Yen *et al.*, 2008). However, reasoning is not the only component of attitudes but also affective elements (Ajzen, 2001, Agarwal and Malhotra, 2005, Kim *et al.*, 2007). Thus, it is essential to include reasoning and affective elements in behaviour models (Aertsens *et al.*, 2009), especially for local (ofada) rice consumption.

In line with this multi-component understanding of attitude, this study examines the role of affective elements such as consumer trust for, and hedonistic (price) value of local (ofada) rice and reasoning factors in the form of consumer healthism on local (ofada) rice consumption behaviour. According to Keller, (2008) and Liu *et al.*, (2017), consumer satisfaction and consumer brand loyalty are conventional conceptualizations of consumer

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behaviour. Oliver, (2014) described consumer satisfaction as a consumer's confidence that a product or service provides consumption-related satiety by specific consumption-centered goals. An established link is connecting consumer loyalty to producers' financial ability which is due to a positive relationship between consumers' satisfaction and purchase intentions (Cronin and Taylor, 1992) as well as recurrence purchasing behaviour (LaBarbera and Mazursky, 1983). Consumer loyalty is defined as the attachment that a consumer has to a brand (Aaker, 1991). Consequently, consumer loyalty has a positive influence on purchasing behaviour as emphasized in branding research (Watson *et al.*, 2015; Ou *et al.*, 2017). For instance, Chaudhuri and Holbrook, (2001) posited that higher brand loyalty is an excellent instrument to improve brand performance and company sales. Also, Reichheld (1996) stated that there exists a positive relationship between brand loyalty of consumers and their willingness to pay a higher price for that brand. According to Yoo *et al.*, (2000), it is challenging, convincing loyal consumers to switch to another brand, as they are known for the regular purchase of their favourite brand. Thus, both satisfaction and loyalty are essential factors in measuring business performance based on the customer perspective. Therefore, satisfaction and loyalty complement conventional financial performance measures (Hoque, 2014).

6.2.1 Specification of Hypotheses

In agreement with the literature on the importance of the three critical dimensions aforementioned (consumer health consciousness, hedonistic value and consumer level of trust) as predictors of local (ofada) rice satisfaction and loyalty, this study postulates that satisfaction and loyalty of local (ofada) rice consumers are negatively affected by a situation where the perceptions of other consumers are misaligned when compared with the perceptions of their ideal counterparts in terms of the three critical dimensions. Therefore, the study hypothesized as follows:

H1₀: Deviation from the ideal profile of local (ofada) rice consumer health benefits perceptions has no significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

H1₁: Deviation from the ideal profile of local (ofada) rice consumer health benefits perceptions has significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

H2₀: Deviation from the ideal profile of local (ofada) rice consumer hedonistic values perceptions has no significant effect on (a) consumer satisfaction; and (b) the consumer loyalty.

H2₁: Deviation from the ideal profile of local (ofada) rice consumer hedonistic values perceptions has significant effect on (a) consumer satisfaction; and (b) the consumer loyalty.

H3₀: Deviation from the ideal profile of local (ofada) rice consumer trust has no significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

H3₁: Deviation from the ideal profile of local (ofada) rice consumer trust has significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

H4₀: Total deviation from the ideal profile of local (ofada) rice consumer has no significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

H4₁: Total deviation from the ideal profile of local (ofada) rice consumer has significant effect on (a) consumer satisfaction; and (b) consumer loyalty.

6.3 Methodology

6.3.1 Model specification

For consumer satisfaction and loyalty, the study constructs aggregated and the disaggregated profile deviation variables. The calculations based on three dimensions which include consumer health consciousness, consumer hedonism, and consumer trust. Aggregated profile deviation is the total misalignment score of a consumer in the local (ofada) rice satisfaction, and loyalty calibration sample mean in terms of the three dimensions stated above. The formula for calculating the misalignment variable is as follows:

$$Total\ profile\ deviation = \sqrt{\sum_{j=1}^a (z_{ij} - \bar{z}_{ideal})^2} \quad (6.1)$$

Where;

z_{ij} = Score for consumer i for j th dimension;

\bar{z}_{ideal} = mean for the ideal consumer profile on the j th dimension.

The study focuses on three key dimensions of local (ofada) rice satisfaction and loyalty (consumer health consciousness, consumer hedonism, and trust). This allows the calculation of profile deviation scores between, on the one hand, the average local (ofada) rice-related perceptions of benchmark consumers along the above three dimensions in each calibration sample and the corresponding perceptions of local (ofada) rice consumers in each respective study baseline sample on the other. Total profile deviation corresponds to the aggregated total

profile deviation of a consumer in the local (ofada) rice satisfaction, and loyalty study samples from the corresponding satisfaction and loyalty calibration sample mean in terms of the three individual dimensions considered for the profile deviation (Anisimova and Mavondo, 2010). Besides, we calculated disaggregated profile deviation scores for each of the three unique dimensions used in the total profile deviation calculations. The disaggregated profile deviation scores were computed as follows:

$$profile\ deviation = \sqrt{(z_{ij} - \bar{z}_{ideal})^2} \quad (6.2)$$

Where;

$j = jth$ of the three profile deviation dimensions.

Therefore, profile deviation variables are constructed for each of the dimensions based on the respective calibration.

In line with the method of Venkatraman and Prescott, (1990), the study first formulates calibration samples, by establishing ideal local (ofada) rice consumer profiles against which other local (ofada) rice consumers are compared. Based on this, local (ofada) rice consumers were ranked in terms of their satisfaction and loyalty, selecting the top ten percent in each case for the calibration samples, one each for satisfaction and loyalty (Malhortra *et al.*, 2013). These samples use the top ten percent of local (ofada) rice consumers to identify the ideal profiles in terms of the three key consumption determinants such as healthism, hedonism, and trust. The second step involved the removal of the bottom ten percent along the satisfaction and loyalty scales to avoid estimation bias for testing the misalignment propositions (Venkatraman and Prescott, 1990). The study then employed the Ordinary Least Square (OLS) regression to test for profile deviation. One of the advantages of profile deviation is the possibility of including more variables without having to increase the sample size. Thus, profile deviation gives room for general identification of the benchmark local (ofada) rice consumer. Hence, the regression equation involving aggregated profile deviation is specified as follows:

$$y_{ib} = \beta_0 + \beta_1 P_i + \beta_2 u_{i1} + \dots + \beta_n u_{in} + \varepsilon_i \quad (6.3)$$

Where:

y_{ib} = local (ofada) rice consumer i 's score for behavioural outcome b ; with $b=1$ for satisfaction; $b = 2$, for loyalty.

P_i = aggregated profile deviation score of consumer i in the study sample from the calibration sample mean in terms of the three key antecedents (healthism, trust and hedonism) of local (ofada) rice satisfaction and loyalty.

u_{in} = consumer i 's outcome for control variable n

ε_i = error term.

Also, regression equation involving the disaggregated profile deviation variable is specified as follows:

$$y_{ib} = \beta_0 + \beta_1 P_{i1} + P_{i2} + P_{i3} + \beta_2 u_{i1} + \dots + \beta_n u_{in} + \varepsilon_i \quad (6.4)$$

This equation resembles equation (6.3), apart from the P variables that have been disaggregated.

P_{i1} = profile deviation score for consumer health consciousness;

P_{i2} = profile deviation score for consumer hedonism; and

P_{i3} = profile deviation score for consumer trust

6.3.2 Definition of variables

6.3.2.1 Dependent variables

Dependent variables used in the study are the satisfaction and loyalty of the local (ofada) rice consumer. The satisfaction variable for this study is a single-item scale as it is widely used and can be considered a fundamental and valid satisfaction indicator (Selnes 1993; Yi, 1991). According to Davies and Chun, (2002), the choice of overall satisfaction question will help to capture better the emotional, rather than the functional dimension of satisfaction since much branding activity are concerned with building emotional values. The loyalty variable is a multi-item construct. Both satisfaction and loyalty variables are measured on 7-point Likert scales.

6.3.2.2 Independent variables

Independent variables used in the study include control variables such as age, gender, household size, household income, educational attainment of household head, and frequency of local (ofada) rice consumption; aggregated profile deviation and disaggregated profile deviations. Calculations for aggregated and disaggregated profile deviation as mentioned

above are on the three dimensions, which are multi-item constructs measured on 7-point Likert scales

6.3.3 Study area, sampling and method of data collection techniques

Analysis of this chapter relied on the same data set of 600 rice consuming households described in chapter three.

6.4. Results and discussion

6.4.1 Key variables used in the study

The questions regarding consumer satisfaction, loyalty and the three critical dimensions used for the constructs were framed more specific as shown in Table 6.1. Survey questions were assessed with 7-point Likert scales. The reliability of the data was also tested according to Cronbach's Alpha values. The recommended value for Cronbach Alpha (α) is 0.60 or higher as postulated by Nunnally and Bernstein (1994). For this study, the Cronbach's Alpha values for the variables exceed the recommended threshold, showing that the measures have acceptable reliability towards their respective constructs.

Table 6.1: Question items used in the study

Construct	Items	Cronbach alpha	
Consumer Satisfaction	I am satisfied with the available local (ofada) rice in market.	0.67	
Consumer Loyalty	I will continue purchasing local (ofada) rice. I would gladly purchase more local ofada rice if available in the market. I look for pure local (ofada) rice before buying it. I would recommend the purchase of a local (ofada) rice to a friend/family. If local (ofada) rice and imported rice are of the same price; I would prefer local (ofada) rice.		
Consumer Trust	I trust local (ofada) rice sellers. I trust local (ofada) rice producers. I trust claims on local (ofada) labels. I trust a product that carries local (ofada) rice label. There is lack of proper awareness in the society about availability of local (ofada) rice		0.68
Health Consciousness	Local (ofada) rice is more nutritious in terms of higher starch, vitamins and minerals than imported rice brands. Local (ofada) rice is better for my health than imported rice. Local (ofada) rice is fresher and safer than imported brands. I consider myself very health conscious. Local (ofada) rice helps to live a healthy lifestyle. I normally observe dietary recommendations in my meals. There are problems associated to consumption of local (ofada) rice.		0.64
Hedonistic Value	It is suitable for social occasions. Local (ofada) rice has a pleasant aroma. Eating ofada rice is a sign of prosperity. Local (ofada) rice is readily available in shops. I get pleasure eating local (ofada) rice.	0.69	

6.4.2 Correlations matrix for both satisfaction and loyalty.

The study examines the correlation matrix for both satisfaction and loyalty with the independent variables (Tables 6.2 and 6.3). If any of the correlations are higher than 0.90, it is strong evidence that method bias exists. Pearson's correlation coefficient was used to determine whether statistically significant mutual relationships existed between the dependent variables and independent variables.

Table 6.2: Correlations matrix for consumer satisfaction.

Variables	1	2	3	4	5	6	7	8	9	10	11
1 Satisfaction	1										
2 Health consciousness	-.018	1									
3 Hedonistic value	-.142**	-.165**	1								
4 Level of Trust	.004	.106*	.108**	1							
5 Total Profile Deviation	-.038	.100*	.380**	.877**	1						
6 Age of household head	.161**	-.322**	.164**	.079*	.095*	1					
7 Gender of household head	.001	.192**	-.124**	-.170**	-.165**	.176**	1				
8 Household income/Month	.052	.051	.019	.002	.033	.014	.066	1			
9 Educational qualification	.150**	-.002	-.094*	-.020	-.062	.075	.111**	-.020	1		
10 Frequency of consumption	.148**	-.246**	.148**	.155**	.058	.411**	.231**	-.011	.233**	1	
11 Household Size	.204**	-.002	-.014	-.039	-.060	.019	.009	.064	.058	.086*	1

*Note: Bold figures are significant values, * Denotes level of significance at 10%; and ** at 5%,*

Correlation between local (ofada) rice consumer satisfaction and dependent variables as reported in Table 6.2, shows that there are statistically significant correlations existing between satisfaction and hedonistic value, age, education, the frequency of consumption, and household size. The correlations between satisfaction and these dependent variables are quite low, mostly below 0.2. The highest correlation exists between satisfaction and household size ($r = 0.20$). Only hedonistic value has a significant negative correlation with satisfaction among all the dependent variables.

Table 6.3: Correlations matrix for consumer loyalty.

Variables	1	2	3	4	5	6	7	8	9	10	11
1 Loyalty	1										
2 Health consciousness	-.023	1									
3 Hedonistic value	-.110*	-.154**	1								
4 Level of Trust	-.046	.098*	.422**	1							
5 Total Profile Deviation	-.124*	.104*	.771**	.858**	1						
6 Age of household head	.080	-.415**	.346**	.043	.029	1					
7 Gender of household head	.012	.237**	-.048	-.324**	-.298**	.319**	1				
8 Household income/month	-.009	.050	.063	-.040	.009	.015	.067	1			
9 Educational qualification	.131**	-.015	-.219**	-.085	-.259**	.172**	.168**	.013	1		
10 Frequency of consumption	.073	-.314**	.249**	.264**	.122*	.583**	.390**	-.004	.211**	1	
11 Household Size	.081	-.109*	-.042	-.080	-.087	.0124*	.061	-.081	.036	.078	1

Note: Bold figures are significant values, * Denotes level of significance at 10%; ** and at 5%,

As shown in Table 6.3, Pearson's correlation coefficients are calculated to determine if statistically significant relationships exist between loyalty and dependent variables. The correlations between loyalty and some independent variable (hedonistic value, aggregated profile deviation, and education) are statistically significant. They yield correlation coefficients greater than 0.10, which indicates that relationships exist between the mentioned variables (Table 6.3). Both hedonistic value and total profile deviation have negative relationship with loyalty while education qualification exhibits positive relationship with loyalty.

6.4.3 Profile deviation results for consumers' satisfaction.

Profile deviation results for consumers' satisfaction with local (ofada) rice based on Ordinary Least Square regressions (OLS) are reported in Table 6.4. Model 1 presents regression results regarding the effects of only control variables on the dependent variable (Satisfaction). Model 2 is the result for aggregated (Total) profile deviation. Model 3 reports results for analysis involving tests of the effects of disaggregated profile deviation variables on local (ofada) rice satisfaction. For all the models, Variance Inflation Factors (VIF) (1.11, 1.09 and 1.19) are well below the cut-off value of 10 (Table 6.4), which suggest that multicollinearity issues are not a concern in the analysis (Neter *et al.*, 1996).

Table 6.4: Estimated parameters for profile of the most satisfied consumers of the local (ofada) rice.

Variables	Consumer Satisfaction		
	Model 1	Model 2	Model 3
Age of household head	.010** (.004)	.011** (.004)	.014*** (.004)
Gender of household head	-.077 (.069)	-.091 (.070)	-.153** (.074)
Household Size	.111*** (.027)	.109** (.027)	.107*** (.027)
Total household income per month range	.047 (.046)	.049 (.046)	.051 (.046)
Educational qualification of household head	.069** (.026)	.067* (.026)	.055** (.026)
How often do you eat ofada rice?	.098 (.080)	.104 (.080)	.168** (.083)
Total Profile Deviation		-.004 (.004)	
Health consciousness			.073 (.068)
Hedonistic value			-.063*** (.016)
Level of Trust			-.010 (.022)
R ²	.089	.091	.121
VIF	1.11	1.09	1.19
N	460	460	460

* Denotes level of significance at 10%; ** at 5%, and *** at 1%

As regards profile deviation in terms of health consciousness, the analysis revealed fascinating insights. Though the coefficient is not statistically significant, it does have a positive effect on local (ofada) rice satisfaction (Model 3). On the other hand, regarding profile deviation for hedonistic value (Price), the coefficient is negative and statistically significant for consumers' satisfaction of local (ofada) rice. Lastly, the coefficient of trust is negative but not statistically significant for consumers' satisfaction. Therefore, hypothesis 1a was accepted while hypotheses 2a and 3a were rejected. This suggests that hedonistic value (price) and trust level need to be improved on in order to increase consumers' satisfaction of local (ofada) rice. Model 2 indicates that the total aggregate profile deviation coefficient is negative and not statistically significant for consumers' satisfaction. As a result, hypothesis 4a was rejected. This result shows that misalignment from the total deviation between other consumers perceptions relative to ideal local (ofada) rice consumers perceptions, leads to a negative effect on local (ofada) rice consumer satisfaction.

As regards control variables' effect on the satisfaction of consumers with local (ofada) rice (Model 1), the coefficient for age is positive and significantly affects consumers' satisfaction of local (ofada) rice. Thus implying that the older consumers (base category) are more satisfied with the consumption of local (ofada) rice than the younger ones. A plausible explanation for this could be that the older consumers have been consuming local rice brands before the advent of foreign rice importation, and therefore had developed an affinity for local (ofada) rice. Another reason could be that older consumers have higher purchasing power than the younger ones, as a result of accumulated assets and well-paid jobs, coupled with other sources of income can afford the high price of local (ofada) rice as compared to the price of imported rice.

Also, the coefficient of household size is positive and statistically significant in explaining consumers' satisfaction for local (ofada) rice. This shows that small sized households (base category) are more satisfied with local (ofada) rice compared to large sized households. This result was expected because large households are expected to opt for cheaper varieties due to their size since the price of local (ofada) rice in the market is almost double the price of imported varieties due to its quality and cost of production. The implication of this is that respondents with small family size can afford well-packaged local (ofada) rice. This result is in agreement with the study of Sowunmi *et al.*, (2014), who concluded that monthly income and household size are among the significant factors affecting household's choice of local (ofada) rice in Nigeria.

The coefficient of the year of education is positive and statistically significant with consumers satisfaction of local (ofada) rice, indicating that the more educated respondents are, the more likely they are to be satisfied with local (ofada) rice consumption. Education might reflect better access to new information on the latest improvement in local (ofada) rice and the health benefits attached to the consumption (Danbaba *et al.*, 2011; Gyimah-Brempong *et al.*, 2016).

6.4.4 Profile deviation results for consumers' loyalty

Results of profile deviation for consumers' loyalty for local (ofada) rice are presented in Table 6.5. Variance Inflation Factors (VIF) (1.25, 1.31 and 1.82) for the three models are well below the cut-off value of 10 (Table 6.5). Model 1 represents the effects of control variables on consumers' loyalty, model 2 represents the effect of aggregated total profile

deviation variable while the third model represents disaggregated profile deviation variable on the consumers' household loyalty of local (ofada) rice.

Table 6.5: Estimated parameters for profile of the most loyal of the local (ofada) rice consumers.

Variables	Consumers Loyalty		
	Model 1	Model 2	Model 3
Age of household head	.004 (.005)	.004 (.005)	.009 (.006)
Gender of household head	-.075 (.082)	-.161* (.088)	-.212* (.119)
Household Size	.127*** (.030)	.132*** (.029)	.129*** (.030)
Total household income per month range	-.016 (.049)	-.010 (.048)	-.009 (.048)
Educational qualification of household head	.091* (.048)	.053 (.050)	.048 (.050)
How often do you eat ofada rice?	.039 (.096)	.110 (.099)	.160 (.120)
Total Profile Deviation		-.010** (.004)	
Health consciousness			.069 (.077)
Hedonistic value			-.038* (.019)
Level of Trust			-.031 (.028)
R ²	.074	.093	.096
VIF	1.25	1.31	1.82
N	336	336	336

* Denotes level of significance at 10%; ** at 5%, and *** at 1%

Model 1 reveals the effects of control variables on consumers' loyalty towards local (ofada) rice. The result shows that household size and educational qualifications were the significant variables influencing consumers' loyalty. Household size has positive coefficient and statistically significant effect on consumer loyalty. This implies that small sized households (base category) are more loyal to local (ofada) rice consumption than large sized households. This could be attributed to the low swelling capacity of local rice in Nigeria as postulated by Akaeze (2010) that rice consumer households in Nigeria prefer foreign rice to locally produced rice because of the latter's low swelling capacity, an attribute that may not favour large households in terms of consumption. Also, educational qualification coefficient is positive and statistically significant. This suggests that consumers with higher educational attainments are more loyal to local (ofada) rice consumption than consumers with lower

educational status. The possible explanation could be that educated households are knowledgeable about the benefits attached to the consumption of local (ofada) rice and are well-informed on latest improvements in the processing and packaging of local (ofada) rice, especially in relation to health. This is in agreement with Suh *et al.*, (2015), who asserted that there exists a positive relationship between customer education and customer loyalty.

Model 2 indicates that the total aggregate profile deviation coefficient is negative and statistically significant for consumer loyalty. Therefore, hypothesis 4b is rejected. This result, confirms that a change from the total profile deviation between other consumers perceptions regarding local (ofada) rice relative to ideal local (ofada) rice consumers perceptions, leads to a negative effect on local (ofada) rice consumer loyalty.

Model 3 reports result of analysis involving tests of the effects of disaggregated profile deviation variables on local (ofada) rice loyalty. Profile deviation in terms of health consciousness was not found to have a negative effect on local (ofada) rice loyalty, as indicated by a positive but not statistically significant coefficient. This means that consumers are loyal to local (ofada) rice because of health benefits. Regarding profile deviation in terms of consumer hedonism in local (ofada) rice, the coefficient is statistically significant in consumer loyalty, with the expected negative coefficient signs. The result regarding profile deviation based on consumer trust is also not statistically significant but has negative effect on consumer loyalty. Hence, hypothesis 1b is accepted while hypotheses 2b and 3b were rejected. The implication of this is that any increase in local (ofada) rice price, will reduce consumer loyalty.

Regarding control variable effects, the analysis provides several insights. First, the negative and statistically significant coefficient of gender in model 3 suggests that the loyalty of female consumers toward local (ofada) rice is higher than their male counterparts (base category). This is in line with previous findings by McFadden and Huffman, (2017) that women are more loyal to their food choice than men. On the other hand, the positive and statistically significant effects for household size indicates that small households (base category) are more loyal to local (ofada) rice compared to large households.

6.5 Conclusion and policy implications

This study has revealed significant negative consumer satisfaction and loyalty implications of deviating from an ideal consumer profile. Having a closer look at the results, both consumer

loyalty and consumer satisfaction have the same level of negative consequences. Considering the aggregate (total) profile deviation in both cases, the variance explained by the models are almost the same for satisfaction and loyalty. Moreover, when looking at the disaggregated profile deviation (P) effects, both hedonistic value and trust predict negative consumer satisfaction and loyalty outcomes. This outcome suggests that improving consumer satisfaction and loyalty have similar challenges and require similar approach. It is consumer hedonistic value and trust in local (ofada) rice that account for the significance of the total profile deviation result. Hence, from a theoretical perspective as well as from a managerial point of view, reduction in the price of and building trust in local (ofada) rice are critical to achieving improved consumer's satisfaction and loyalty. Efforts should be made by the concerned authorities and stakeholders in the rice value chain in making sure that there is reduction in cost of production in order to bring down the market price of local (ofada) rice and in extension, local rice generally. Also, this result would assist local (ofada) rice marketers in making more informed marketing-related decisions like creating effective branding strategies and marketing communications to enhance consumer-based brand equity for local (ofada) rice.

CHAPTER 7

Summary, Conclusion and Policy Recommendation

7.1 Summary

The Nigeria rice industry, over the years has been one of the most remarkable sub-sectors contributing immensely to the country's economy. Rice is a staple food mostly consumed by about 180 million of Nigeria's population (Akaeze, 2010). The demand for rice in Nigeria has been estimated at 5 million tonnes per annum with domestic production accounting for less than 4 million tonnes, leaving a gap of about 1 million tonne (Federal Ministry of Agriculture and Rural Development (FMARD), 2012; Danbaba *et al.*, 2017). As opined by Osagie (2014), the daily expenditure incurred by the Nigeria government on rice importation is about one billion naira, consequently, having a negative effect on Nigeria foreign reserves but enriching countries from whom this rice product is imported. According to Akaeze (2010), Nigeria is the highest consumer of rice in West Africa, and its consumption to some individuals is a habit, while to others, it is for the intrinsic quality such as taste, nutrition etc. International Rice Research Institutes (IRRI) (2014) reported that, consumers' preferences are shifting from traditional staples (such as cassava, maize, and yam) to rice and preference for both local and foreign varieties is based on quality attributes.

The importance of rice in Nigerian diet has made its importation to be a major aspect of Nigeria's agricultural imports and there has been a significant effort on the part of the government to improve on the quality of local rice to make it compete with the foreign brands (Frederic *et al.*, 2003). Demont *et al.*, (2013), stated that local rice can compete with imported counterparts if the standard is directed towards consuming households' expectations and that quality cues both intrinsic and physical can function as catalysts for increasing and consolidating the rice value chain. Part of the efforts made by the government included the introduction of Nigerian Rice Development Strategy (NRDS) established in 2009, saddled with the responsibility of increasing paddy rice production from about 3.0 million tonnes in 2007 to over 12.0 million by 2018 to make Nigeria self-sufficient in rice production. Also, the presidential initiative on rice set up in 2001 was focused on increasing rice production, processing and exports aimed at achieving self-reliance, among others (FMARD, 2012).

Bearing in mind the expected increase in production of local rice; most especially local (ofada) rice as a result of current intervention by government, the need for sustainable production hinges on increase in demand for local (ofada) rice by households. There exists a dearth of research on the demand side of the Nigerian local rice industry with respect to identifying various rice consumers' household segments, their nutritional knowledge, acceptability and quality perceptions as it relates to local (ofada) rice.

This study had contributed to the existing knowledge by attempting to fill the above mentioned gaps in the literature, particularly in Nigeria rice industry, using data collected from 600 local (ofada) rice consumers' households in the south-west region of the country. This chapter provides the conclusions drawn from the key findings of the study, make policy recommendations and suggest potential areas for further studies. The remainder of the chapter subsequently provides the summary outcomes of the empirical analysis done in chapter three to six.

7.2 Conclusion

Chapter three examined the effect that the of households' knowledge of local (ofada) rice has on it consumption. The study hypothesized dietary knowledge affects consumption of local (ofada) rice. Empirical findings revealed that dietary knowledge, as well as some sociodemographic variables have positive impact on households' consumption of local (ofada) rice. It means that better education about the benefits associated with this rice brand (ofada rice) will increase its consumption. Moreover, increased consumption will help reduce prevalence and further complication of non-communicable diseases, since unpolished brown rice such as local (ofada) rice contains mineral elements that help in reducing high risk of these diseases. Furthermore, consumption will lead to increase in local rice production, which will help to reduce the level of importation and reduce Government expenditure on rice importation.

The empirical evidence from the factor analysis in chapter four established the importance of some of the attributes considered for the study. It was revealed that households in south-west Nigeria valued virtually all the local (ofada) rice attributes. Standardised estimates for confirmatory factor analysis showed that attributes under benefits, search and intrinsic factors correlate well while some important attributes are missing under experience and extrinsic factors, which are probably not included in this study. Also, benefit factor highly correlates with search factor (0.66). Furthermore, the study segmented households based on the

identified factors from factor analysis. Also, three clusters were identified for local (ofada) rice consumers' households and each segment (cluster) has different concerns and interests towards local (ofada) rice variety. Cluster 1 considered all the attributes of local (ofada) rice variety as important and was named meticulous cluster; cluster 2 valued physical appearance of the local (ofada) rice and was named extrinsic cluster; while cluster 3 was named casual because they were neutral to all the attributes considered for quality perceptions of local (ofada) rice, indicating a type of ethnocentric behaviour of the consumers. The substantial finding from this study is the fact that, well processed and packaged local (ofada) rice is largely available in Lagos State as revealed from the responses of local (ofada) rice consumers' households from that location.

In chapter five, consumer's acceptability of local (ofada) rice based on quality attributes were estimated using Kendall's Coefficient of Concordance and Hedonic model. The economic value of a good is revealed by the consumer's willingness to pay for the good. Estimates from Kendall's Coefficient of Concordance revealed that there is 73.74% agreement in ranking quality attributes of local (ofada) rice consumers' households in the study area. Empirical findings from hedonic price function established that rice consumers' households in south-west, Nigeria considered product attributes such as physical appearance and cooking quality when making purchasing decision, and quality attributes contributes about 41% of prices pay by local (ofada) rice consumers' households. Quality attributes such as light brown after-cook colour, grain shape, perceived nutrient level and perceived chemical storage influence market price of local (ofada) rice and consumers would pay premiums of ₦71.03, ₦21.06, ₦14.41 and ₦32.98, respectively for these quality attributes.

Misalignment implications for deviating of ideal local (ofada) rice consumer was examined in chapter 6 by employing profile deviation analysis (PDA). This study has revealed significant negative consumer satisfaction and loyalty implications of deviating from an ideal consumer profile. The result showed that both consumer loyalty and consumer satisfaction have the same level of negative consequences. Considering the aggregate (total) profile deviation in both cases, the variance explained by the models are almost the same for satisfaction and loyalty. Moreover, when looking at the disaggregated profile deviation (P) effects, both hedonistic value and trust are predicting negative consumer satisfaction and loyalty outcomes. This suggests that local (ofada) rice satisfaction and loyalty have similar challenges and required same task. It is consumer hedonistic value and trust in local (ofada) rice that account for the significance of the total PD result.

7.3 Recommendations for policy implications

The development of Nigeria's rice industry requires a multi-dimensional approach involving a blend of research, policies and strategies among key value chain actors and institutions on production, processing and marketing. The findings of this study have given rise to a number of policy implications and recommendations for the government, private firms and researchers in the rice sub-sector of Nigeria's economy. These include:

- Nutritional messages that are appealing about local (ofada) rice variety be introduced through advertisement on different media such as radio, television and print media.
- An effective dietary education about health and other benefits of consuming local (ofada) rice should be developed to promote its consumption in the diets of Nigerians.
- Marketers and others in the rice value chain should come up with a good marketing strategy and policy to make well processed and packaged local (ofada) rice available across the country.
- Efforts towards improving rice production in Nigeria, especially local (ofada) rice must aim to appropriate these preferred quality attributes by the consumers into breeding programmes to make local (ofada) rice attractive to the rice consumers' households by increasing investment in the rice value chain, with much focus on the processing stage where quality standards remain the top-most priority.
- Modern rice processing and polishing that incorporate traditional technology is required to improve both extrinsic and intrinsic qualities (such as swelling capacity, rate of breakage, texture etc.) of local (ofada) rice to enhance consumers households' acceptability, affordability and competitiveness. Consequently, increased production through consumers' acceptability, which could make local (ofada) rice have a larger market share against imported brands and improve living standard of farmers, and processors through increased earnings.
- Theoretically, as well as from managerial point of view, reduction in price of and building trust in local (ofada) rice are critical to achieving improved consumer satisfaction and loyalty. Efforts should be made by the concerned authorities and stakeholders in rice value chain in making sure that there is a reduction in the cost of production to bring down the market price of local (ofada) rice and by extension, local rice generally.

- Lastly, this result would assist local (ofada) rice marketers in making more informed marketing-related decisions like creating an effective branding strategies and marketing communications to enhance consumer-based brand equity for local (ofada) rice.

7.4 Study limitations and suggested areas of further research

The limitations and approach used in this study has raised the need for further studies on this subject. These include:

- This major limitation of this study is the sample location which focused only on South-West region of the country. Nigeria is comprise of six regions and the country is of large population in which different socio-economic statuses, cultures and environmental diversity influence people’s way of life including their food choices and consumption pattern. However, the choice of South-West region as the only area of study has limited the data and scope of this study. Therefore, there is need for more studies of this kind covering other regions in Nigeria.
- There are several brands of local rice which this study has not considered. There is need for conducting a comparative analysis of consumers’ pricing of the intrinsic quality attributes of each brand of local rice. This will provide a better understanding of how consumers make their purchasing decisions;
- Having determined from this study the additional prices consumers pay for preferring quality attributes of local (ofada) rice, further studies are required to determine the additional cost implications of investing in breeding and processing programmes aimed at upgrading the current level of quality attributes of local rice brand generally to meet the level of imported rice brands as desired by consumers. This is necessary for the cost-benefit analysis of such investments in rice improvement programmes.

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LIST OF APPENDICE

APPENDICE I: Research Questionnaire

RESEARCH QUESTIONNAIRE

UNIVERSITY OF KWAZULU-NATAL

RESEARCH TOPIC: HOUSEHOLDS' CONSUMPTION AND QUALITY PERCEPTIONS OF LOCAL (OFADA) RICE IN SOUTH-WEST, NIGERIA.

Serial number of questionnaire.....

Introduction and consent

Please, introduce yourself to the respondent: My name is _____. I am an enumerator collecting data on behalf of Ayodeji Oluwaseun Ogunleke, a PhD student at the University of KwaZulu-Natal, South Africa. The research aims at analysing local rice demand behaviour of households. Before I begin, I would like to assure you that your responses will be strictly used for academic research and will be treated anonymous and confidential. Your name will not be mentioned anywhere in the research work. Therefore, try as much as possible to be accurate and objective in your responses.

In the process of interview, you are free to interrupt me and ask for any clarification. You have the liberty or legal right to call the principal researcher (Mr Ayodeji Oluwaseun Ogunleke) on the mobile number 07034722433 and ask for any clarification at any point in time. I respect all the responses you give and appreciate your cooperation.

REFERENCE INFORMATION:

CONTACT INFORMATION ON ENUMERATORS AND RESPONDENTS.

Enumerator's Information		Respondent's Information			
Name of enumerator		Phone Number		Name of Ward	
Contact Number		House Number		LGA	

Enumerator's code		Date:		State	
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SECTION A. SOCIOECONOMIC CHARACTERISTICS OF RESPONDENTS

1. Household basic characteristics

1.1 Are you the household head?	Yes []	No []
1.2 If no, state your relationship with household head	Spouse []	Child/House help []
1.3 Age of household head		
1.4 Gender of household head	Male []	Female []
1.5 Marital status of household head	Married []	Single []
1.6 Household size		
1.7 Household composition by sex	Number of male..... Number of female.....	
1.8 Number of people in the household in the following age categories	<18..... 18-60..... >60.....	
1.9 Educational qualification of household head	No education () Informal () Primary () Junior Secondary () Senior Secondary () Tertiary ()	
1.10 Primary occupation of household head	Farming () Civil service () Trading () Artisanship ()	
1.11 Number of income earners in the household (i.e income earning household members)		
1.12 Total household income per month (N/Month)		

SECTION B: HOUSEHOLD DIETARY KNOWLEDGE, ACCEPTABILITY & PERCEPTION OF LOCAL RICE.

1. HOUSEHOLD DIETARY KNOWLEDGE OF LOCAL RICE.

- i. How do you source for dietary information?.....
(a) Personal (b) Family (c) Associates (e) Nutritionist (f) Health care professionals.
- ii. Are you aware of health importance of eating Ofada rice? (a) Yes (b) No.
- iii. Are you particular about brand or product labels? (a) Yes (b) No.
- iv. Do you normally observe dietary recommendation in your meals? (a) Yes (b) No.
- v. Do you perceive the importance of dietary guidance? (a) Yes (b) No.
- vi. Have you heard about any health problem caused by eating too much of Ofada rice?
(a) Yes (b) No.
- vii. If yes to question ‘f’, please, mention
- viii. What class of food does rice belong to?.....
- ix. What type of nutrient can you derive from eating rice?.....
- x. Are you aware of any dietary information available in Nigeria on Ofada rice? (a) Yes
(b) No
- xi. If yes, how does such affect your Ofada rice consumption decisions?.....
(a) Increase consumption (b) Decrease consumption (c) No effect
- xii. Is any member of your family on special diet? (a) Yes (b) No
- xiii. Are you aware of any health benefit in eating Ofada rice? (a) Yes (b) No
- xiv. Rank the following sources of dietary information from best source to least source as it relates to you i.e. 1st, 2nd, 3rd, 4th, and 5th.

Dietary Information Source	Rank
a. Personal	
b. Family	
c. Associate	
d. Nutritionist	
e. Health Care Professionals	

- xv. Rate the following as: important =1, somewhat important =2, not important =3 and not at all important =4, based on your dietary knowledge/information.

Information	Rating
a. Use salt or sodium only in moderation	
b. Choose a diet low in saturated fat	
c. Choose a diet with plenty of fruits and vegetables	
d. Use sugar in moderation	
e. Choose a diet with adequate fibre	
f. Eat a variety of foods	
g. Maintain a healthy weight	
h. Choose a diet low in fat	
i. Choose a diet low in cholesterol	
j. Choose a diet with plenty of breads, cereals, rice, and pasta	
k. Eat at least two armful (Ekunwo) of dairy products daily	
l. Choose a diet high in carbohydrate	
m. Choose a diet high in fibre	

- xvi. Are you aware of the following information about Ofada rice?

a. It is more nutritious than imported rice	Yes () No ()
b. It contains selenium that helps in fighting colon and breast cancer	Yes () No ()
c. It contains more fibre content than imported rice	Yes () No ()
d. It has good taste compare to imported rice	Yes () No ()
e. It has low moisture contents compare to imported rice	Yes () No ()
f. It is good for diabetic patients	Yes () No ()
g. It has higher protein content than imported rice	Yes () No ()
h. It contains higher phosphorus contents compare to imported rice	Yes () No ()

2. ACCEPTABILITY & PERCEPTION OF LOCAL RICE.

i. To what extent do you consider the following as constraints to local rice consumption?

Not very important = 1, Not important = 2, Neutral=3, Important =4 Very important=5

a. Packaging	
b. Texture	
c. Attractiveness	
d. Flavour	
e. Taste	
f. Availability	
g. Price	
h. Expansion	

ii. What is your perception of the following local (Ofada) rice attributes?

Not very important = 1, Not important = 2, Neutral=3, Important =4 Very important=5

<i>Physical Attributes</i>	
a. Colour	
b. Grain shape	
c. Impurities	
d. Rate of breakage	
e. Price	
<i>Cooking Attributes</i>	
f. Ease of cooking	
g. Grain cohesion	
h. Grain size	
i. Swelling capacity	
<i>Eating Attributes</i>	
j. Taste	
k. Aroma	
l. Texture	
<i>Health Attribute</i>	
m. Perceived nutrient level	
n. Perceived	

Freshness	
o. Perceived chemical storage	

iii. Rate the following attributes as they affect price you pay for rice i.e. rice you have eaten

Please tick appropriately

a). *Local (Ofada) rice*

<i>Attributes</i>	<i>Remarks</i>				
<i>Physical Attributes</i>					
a. Colour	Brown red=1	Brown=2	Average=3	Poor=4	Very poor=5
b. Grain shape	Long& slim=1	Long & Fat=2	Average=3	Short/round=4	Broken=5
c. Impurities	Absence/very few=1	Few=2	Average=3	High=4	Very high=5
d. Rate of breakage	very low=1	low=2	Average=3	High=4	Very high=5
<i>Cooking Attributes</i>					
e. Ease of cooking	Very quick=1	Quick=2	Average=3	Slow=4	Very slow=5
f. Grain cohesion	Very sticky=1	Sticky=2	Average=3	Weakly sticky=4	Not sticky=5
g. Grain size	Very long=1	Long=2	Average=3	Short=4	Very short=5
h. Swelling capacity	Very good=1	Good=2	Average=3	Poor=4	Very poor=5
<i>Eating Attributes</i>					
i. Taste	Very good=1	Good=2	Average=3	Poor=4	Very poor=5
j. Aroma	Very good=1	Good=2	Average=3	No aroma=4	Bad smell=5
k. Texture	Very tender=1	Tender=2	Average=3	Hard=4	Very hard=5
<i>Health Attribute</i>					

l. Perceived nutrient level	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5
m. Perceived Freshness	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5
n. Perceived chemical storage	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5

b). Imported rice

<i>Attributes</i>	<i>Remarks</i>				
<i>Physical Attributes</i>					
a. Colour	Very white=1	White=2	Average=3	Poor=4	Very poor=5
b. Grain shape	Long & slim=1	Long & Fat=2	Average=3	Short/round=4	Broken=5
c. Impurities	Absence/very few=1	Few=2	Average=3	High=4	Very high=5
d. Rate of breakage	very low=1	low=2	Average=3	High=4	Very high=5
<i>Cooking Attributes</i>					
e. Ease of cooking	Very quick=1	Quick=2	Average=3	Slow=4	Very slow=5
f. Grain cohesion	Very sticky=1	Sticky=2	Average=3	Weakly sticky=4	Not sticky=5
g. Grain size	Very long=1	Long=2	Average=3	Short=4	Very short=5
h. Swelling capacity	Very good=1	Good=2	Average=3	Poor=4	Very poor=5
<i>Eating Attributes</i>					
i. Taste	Very good=1	Good=2	Average=3	Poor=4	Very poor=5
j. Aroma	Very good=1	Good=2	Average=3	No aroma=4	Bad smell=5
k. Texture	Very	Tender=2	Average=3	Hard=4	Very

	tender=1				hard=5
<i>Health Attribute</i>					
o. Perceived nutrient level	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5
p. Perceived Freshness	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5
q. Perceived chemical storage	Very important=1	Important=2	Neutral=3	Not important=4	Not very important=5

iv. How would you rank these rice quality attributes in order of importance to you (1=Most important; 14=least important). Please tick \surd one box for each quality attribute.

		Level of importance of Rice Quality Attribute													
		Most Important \longrightarrow Least Important													
S/N	Quality Attribute	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	Colour														
B	Texture														
C	Aroma														
D	Level of impurities														
E	Grain cohesion														
F	Taste														
G	Grain Shape														
H	Rate of breakage														
I	Ease of cooking														
J	Swelling Capacity														
K	Perceived Nutrient level														
L	Perceived Freshness														
M	Perceived chemical storage														
N	Grain size														

v. How do you perceive local (Ofada) rice base on the following statement?

Strongly disagree=1, Disagree=2, Neutral=3, Agree=4, Strongly Agree=5	
i. Rate of consuming local rice is more than production	
ii. Local rice consumption is on decreasing rate	
iii. Government needs to pay more attention to local rice production	
iv. Local rice processing is of low quality	
v. There is lack of proper awareness in the society about availability of local rice	
vi. Future of local rice consumption is really a matter of concern	
vii. Local rice has more nutritional value than imported rice	
viii. Rice importation should be banned for the growth of local rice	
ix. Government present policy will increase local rice consumption	
x. It is easy to get local rice in the market	
xi. Local rice is not difficult to cook	
xii. Local rice is not expensive	
xiii. Local rice is better for my health than imported rice	
xiv. Eating Ofada rice is a sign of prosperity	
xv. It can be easily be accompanied by many side dishes	
xvi. It tastes great	
xvii. It is suitable for social occasions (e.g inviting friends for dinners etc)	
xviii. It is easy way to show your cooking skills	
xix. It is an ideal diet	
xx. Ofada rice has a pleasant aroma	
xxi. It tastes better than imported rice	
xxii. There are no or little foreign particles in Ofada rice available in the market.	
xxiii. Aroma makes Ofada rice my choice of rice	

SECTION C

1. Household expenditure on food and other items in the last 3months

S/N	Items	Unit (Kg, Lit., Bundles)	Total consumed in the last one week (Only household members)			Bought in the last 3 months				
			Own Produced	Bought	Cost (₦)	Frequency of buying (e.g. 2 Times per month)	Average quantity each time (e.g. 2kg, 4bundles)	Total quantity in 3 months	Average price per unit	Total Cost of purchase
1	2	3	4	5	6	7	8	9	10 = 8*9	
	<i>Staple food</i>									
1	Local rice (Ofada rice)									
2	Foreign rice									
3	Rice total									
4	Maize									
5	Yam									
6	Yam flour									
7	Cassava									
8	Beans									
9	Gari									
10	Plantain									
	<i>Vegetables</i>									
11	Tomatoes									
12	Pepper									
13	Onion									
14	Okra									
15	Cabbage									
16	Carrot									
17	Spinach									
18	Cucumber									
19	Garlic									
20	Ginger									
21	Salt									
	<i>Fruits</i>									
22	Oranges									
23	Mangoes									
24	Pawpaw									
25	Pineapple									
26	Banana									
27	Apple									
28	Coconut									
	<i>Meat</i>									
29	Beef									
30	Goat meat									
31	Chicken									

32	Bush meat									
33	Fish									
34	Eggs									
	<i>Beverages</i>									
35	Milo/ Bournvita etc									
36	Milk									
37	Soft drinks									
38	Juices									
38	Water									
39	Alcoholic drinks									
	<i>Fats&Oil</i>									
40	Palm oil									
41	Vegetable Oil									
42	Breads									
43	Pastries									
44	Butter									
	<i>Other expenses</i>									
45	Dresses									
46	Education & Health									
47	Utilities e.g Electricity									
48	Ceremonies									
49	Miscellaneous									
50	House rent									

SECTION D: HOUSEHOLD OFADA RICE AND GENERAL FOOD CONSUMPTION

(1) Household Ofada Rice Consumption

- a. Do you eat Ofada rice? (i) Yes (ii) No
- b. Where do you eat Ofada rice?..... (i) Home (ii) Restaurants (iii) Party (iv) Others
- c. How often do you eat Ofada rice? (i) Often (ii) Sometimes (iii) Never
- d. What is the average price of Ofada rice now (Naira/congo)?
.....
- e. Where do you normally purchase your Ofada rice?.....
(i) Own production (ii) Market (iii) Store (iv) Gift (V) Others
- f. Would you increase your consumption if your income increases? Yes () No ().

- g. Which other varieties of rice do you normally buy?.....
- h. Are you aware that local rice is more nutritious and healthier in terms of higher starch, vitamins and minerals than imported rice brands?
(a) much aware (b) aware but does not care (c) Not aware at all
- i. Are you aware that local rice is fresher and safer than imported rice brand in terms of length of storage?
(a) much aware (b) aware but does not care (c) Not aware at all
- j. Are you aware of the cooking procedures involved in preparing local rice brands?
(a) much aware (b) aware but does not care (c) Not aware at all
- k. Are you aware of recent improvements in local rice grains?
(a) much aware (b) aware but does not care (c) Not aware at all
- l. What is your main source of awareness information about local rice brands?
(a) Producer/suppliers' adverts/promotions (b) family/friends (c) none
- m. What is your level of loyalty to your brand of imported rice?
(a) strong (b) weak (c) none
- n. What is your perception level about the quality attributes of local rice brands?
(a) strong (b)weak (c) none
- o. Are local rice brands available in shops near your residence?
(a) readily available (b) not always available (c) not available at all)
- p. Would your awareness of the nutritional and safety superiority of local rice over imported rice influence your decision to buy/eat local rice brands? (a) Yes (b) No
- q. Do you have a particular customer/retailer you buy rice from? (a) Yes (b) No
- r. If Yes, does s/he give you information (generally) about rice in the market? (a) Yes (b) No
- s. If Yes, how do you view such information? (a) Serious (b) Not serious
- t. Does the information given by your customer sometimes influence your buying decision? (a) Yes (b) No

(2) General Household Food Consumption

1. Frequency of rice consumption per month (i.e. number of times rice was consumed in the last one month)	
2. Do you prefer rice to other food items? Yes=1, No=2	
3. If your answer in question 2 is No, which food item do you prefer?	
4. What type of rice do you usually eat? Local=1, Foreign=2, Both local and foreign=3	
5. Reason(s) for your rice consumption preference(s). Tick appropriately in order of importance from 1 to 8	
(i) Price	
(ii) Nutritional quality	
(iii) Taste	
(iv) Ease of preparation	
(v) Grain shape	
(vi) Cleanliness	
(vii) Swelling capacity	
(viii) Colour	
(ix) Origin	
5. Where do you usually purchase rice? Open market=1, supermarket=2, store or shop=3	
6. What quantity of rice do you usually purchase per month in kg?	
7. How much were you purchasing a bag of rice in the following years?	
i. 2013	
ii. 2014	
iii. 2015	