ANALYSIS OF FACTORS, COST-BENEFIT ANALYSIS AND EFFECTS OF VALUE ADDITION STRATEGIES ON CASHEW PRODUCTS PROCESSED IN SOUTH-EAST ZONE, NIGERIA

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A99F/26211/2018

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (AGRIBUSINESS MANAGEMENT), SCHOOL OF AGRICULTURE AND ENTERPRISE DEVELOPMENT, KENYATTA UNIVERSITY

JUNE, 2022.

DECLARATION

I, EZE ANAYOCHUKWU VICTOR declare that this thesis is my original work and has not been presented for the award of a degree in any other university or any other award.

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DEDICATION

I dedicate this thesis to my lovely wife, Mrs. Esther Onyinyechi Eze and my adorable daughter, Miss Nmesomachi Eliana Eze.

ACKNOWLEDGEMENTS

My special appreciation goes to my supervisors, Dr. Ibrahim Macharia, and Dr. Lucy Ngare for their painstaking efforts in ensuring quality supervision of this thesis. Your inputs, comments, remarks, and corrections from the conception of this study to the finish are worthy of commendation.

Equally, my sincere acknowledgement goes to the Chairman, Department of Agricultural Economics, Dr. Eric Bett and the entire lecturers in the Department of Agricultural Economics, particularly the Postgraduate Departmental Coordinator, Dr. Gabriel Mwenjeri for their assistance in fine-turning this research. I will forever be grateful.

My special thanks go to cashew processors in the study area for their cooperation and understanding during the data collection. I also acknowledge my research assistants for their perseverance and professionalism during the data collection.

Furthermore, I most sincerely appreciate the coordination team of Academy Project, an Intra-Africa Academic Mobility Scheme for awarding scholarship to me to pursue this academic programme. My sincere thanks go to the Project Coordinator, Prof. Negadi Latifa, Kenyatta University (KU) contact-person, Prof. Chris Shisanya, and the KU Administrative Staff, Mr. Mark Odhiambo for their immeasurable support, understanding and cooperation throughout my programme.

My profound gratitude goes to my parents, Chief Okoro and Mrs. Eunice Eze, my brothers, sisters and entire in-laws for their unquantifiable support, particularly, to my family throughout the period of my academic sojourn in Kenya. To my lovely wife and daughter, words are not enough to express my deepest appreciation for your sacrifice, endurance and unflinching support despite the deprivation and

denial that my prolonged absent has subjected you to. I appreciate the Nigerian students' community in KU especially Stephen Adekunle Ajayi, Bukar Inuwa, Abu Ahmed, Mrs. Anthonia Ifeoma Okafor, and Mr. Bruno Pius Njepuome for always standing by me.

Finally, I thank God, the Author of knowledge for His infinite mercy, grace and unparalleled love toward me and my family throughout my study duration. To God alone be all the glory.

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LIST OF ABBREVIATIONS AND ACRONYMS

AAD	-	Average Absolute Deviation
ADP	-	Agricultural Development Programme
APP	-	Agriculture Promotion Policy
BCR	-	Benefit-Cost Ratio
CNSL	-	Cashew Nut Shell Liquid
COC	-	Coefficient of Concentration
COD	-	Coefficient of Dispersion
ENDC	-	Eastern Nigeria Development Corporation
FAO	-	Food and Agriculture Organisation
GM	-	Gross margin
IFC	-	International Finance Corporation
INDC	-	International Nut & Dried Fruit Council
LSD	-	Least Significant Difference
MNL	-	Multinomial Logistic
MSMEs	-	Micro, Small and Medium Enterprises
NIVA	-	Net Income from Value Addition
NPC	-	National Population Commission
RCN	-	Raw Cashew Nuts
ROR	-	Rate of Return
RRR	-	Relative Risk Ratio
SDG	-	Sustainable Development Goal
TR	-	Total Revenue
TVC	-	Total Variable Cost
UNIDO	-	United Nations Industry Development Organisation
USA	-	United State of America
USAID	-	United States Agency for International Development
VIF	-	Variance Inflation Factor
WNDC	-	Western Nigeria Development Corporation

ABSTRACT

Nigeria government has over the years come up with different agricultural policy interventions which emphasize value addition to export crops including cashew as a means of job and wealth creations. Despite these interventions, it is still unclear why processors have not been able to exploit this opportunity to enhance value addition to cashew products. It is against this backdrop that this study analysed factors, cost-benefit analysis and effects of value addition strategies on cashew products processed in the South-East zone, Nigeria. The choice of South East zone is based on its antecedent as a major cashew producing zone in Nigeria. Specifically, the study set out to: (i) determine the factors that influence value addition to cashew products processed in South-East zone, Nigeria; (ii) determine the effects of value addition strategies on the competitive advantage of cashew products processed in South-East zone, Nigeria; and (iii) determine the cost-benefit analysis, rate of return on investment, and net income of cashew products processed in South-East zone, Nigeria. The study adopted a cross-sectional survey design using a structured questionnaire to obtain data from 353 randomly and purposively sampled participants. Multinomial logistics (MNL) regression and probit regression were used to analyse objectives (i) and (ii) respectively while ratio statistics, benefit cost ratio, gross margin and rate of return were applied to analyse objective (iii). The findings of the MNL regression reveal that income, type of markets, cashew physiognomies and perception about cost of processing technology have a significant influence on value addition to cashew products in both models at 1% while the coefficients of perception about government policy on cashew processing as well as market facilities show significant at 5% in the second model. Thus confirming the hypothesis that these factors influence value addition to cashew products processed in South East zone, Nigeria. The relative risk ratios for education attainment, age of processor, monthly income, experience from cashew processing, type of markets, market, processors' perception about policy of government on cashew processing as well as market infrastructure being greater than one (RRR > 1), suggest that variation in any of these variables will likely influence the processors' favouring to add value to cashew kernel and both cashew products over cashew nut and vice versa. Furthermore, the probit regression result shows that quality improvement strategy and packaging strategy have a significant and positive effect on the competitive advantage of value-added cashew products at 1%. Meanwhile, the average net income from 1kg of value-added cashew products is profitable with cashew kernel yielding the highest net income (₦2,724.4 (US $7.6) > cashew nut (₦2,547.9 (US $7.1)) > both cashew products (₦2,340.4 (US $6.5)). The benefit-cost ratios for 1kg value-added cashew nut and cashew kernel products were slightly higher (1:1.4) respectively as against 1:1.3 for both cashew products, suggesting that value-added cashew products deliver positive net income to the processors. Equally, the rate of returns (RORs) for 1kg of value-added cashew products yield the highest (38.1 percent) in cashew kernel > cashew nut (37.4 percent) > both cashew products (34.1 percent). More so, the variable costs account for > 96 percent in cashew kernel and both cashew products to ≤ 98 percent in cashew nut of the total cost of value addition to cashew products in South-East zone of Nigeria. The coefficient of dispersion (COD) in revenue/cost of value-added products shows the least variability in cashew kernel (0.097) and

highest in both cashew products (0.122). Confirming that it is least risky to add value to cashew kernel and riskier to add value to both cashew products. The study recommends that government should develop a specific cashew policy for driving value addition programmes across the cashew value chain. Government should come up with programme that will encourage more people to engage in cashew value addition activities because of its high rate of return on investment; and the processors are encouraged to explore training programmes that will enable them to improve quality of value-added cashew products while innovating cashew packs to ensure sustainable competitive advantage from value-added cashew.

CHAPTER ONE

INTRODUCTION

1.1 Background of the problem

Cashew has been planted primarily because of its food and medicinal importance which involves the use of the entire cashew fruit, i.e., the apple, kernel as well as a nut for various industrial purposes (Dendena and Corsi, 2014). Currently, there is a huge market for cashew products. The International Nut & Dried Fruit Council (INDC) (2018) estimated the value of the global cashew market in 2017 to be US $5.26 billion. Although it is difficult to assess the production volumes across the various cashew producing countries, the Food and Agriculture Organisation (FAO) (2018) reported that the production of raw cashew nuts (RCN) has risen from 0.29 million tonnes in 1961 to 2.60 million tonnes in 2013 and further to 4.9 million tonnes in 2016. The share of West Africa in cashew production has also risen over the years with 2 million tonnes representing 42 percent of world cashew output in 2017 (INDC, 2018). This makes West Africa the leading cashew producing region in the world.

The major cashew producing countries in the world and their respective outputs in 2017 are Vietnam (1,221,070 MT), Nigeria (982,530 MT), India (671,000 MT) and Ivory Coast (607,300 MT) (Salau, Popoola and Nofiu, 2017). Prior to the 1980s, Tanzania and Mozambique were the leading cashew-producing African countries (Poulton, 2006). However, recent statistics have shown that Nigeria has overtaken these countries as the leading cashew producing country in Africa and ranks second in the world after Vietnam (Adeigbe, Olasupo, Adewale and Muyiwa, 2015; Salau *et al*., 2017; FAO, 2018). In the last three decades,

cashew production in Nigeria has grown geometrically from 30,000 tons in 1990 to 466,000 tons in 2000, which further rose to 791,726 tons in 2010 and 982,530 tons in 2017 (FAOSTAT, 2019). Cashew is grown in almost every part of Nigeria although commercially, it is largely produced in the southern and the middle belt zones. The major cashew producing states are: Enugu, Abia, Anambra, Ekiti, Benue, Kwara, Kogi, Oyo, and Imo (Ezeagu, 2002; MORGAN, 2016; Salau *et al*., 2017).

Cashew being a cash crop in Nigeria has contributed substantially to the country's Gross Domestic Product and foreign exchange earnings. Earnings from cashew nut exports account for seven to eight percent of non-oil export earnings in Nigeria (Nugawela and Oroch, 2005). The estimated export value from cashew nut ranges from US$ 25 to 35 million per annum (Adeigbe *et al*., 2017). Cashew production and processing activities provide employment and livelihood for smallholder farmers especially women in Nigeria (Akinwale, 2000; Topper *et al*., 2001). Adeigbe *et al*. (2017) estimated that cashew provides a livelihood for over 300,000 farming households and sustains another 600,000 jobs in the value chain activities as harvesters, transporters, processors, marketers, and exporters.

The federal government trade policy of liberalizing export crops has considerably made an impact on the pricing and supply of unprocessed cashew nuts in Nigeria (Ezeagu, 2002; Topper *et al*., 2001). Notwithstanding, Nigeria still offer one of the cheapest sources of raw cashew nuts. Aliyu and Hammed (2008) alluded to this assertion when they stated that Nigerian nuts are constantly be used in Indian and Vietnamese cashew industries and more recently, added substantially to the Brazilian market.

Despite the increasing cashew production output in Nigeria, Agbongiarhuoyi *et al*. (2008) observed that the challenge posed by poor value addition to cashew crop undermines its sustainability in terms of wealth and job creations. The United States Agency for International Development (USAID)-Nigeria (2002) averred that the exports of the non-value-added product (raw nuts), as well as low export of value-added products have been the major constraints to the development of cashew value chain industry, resulting in poor foreign exchange earnings and loss of job opportunities in Nigeria. Adegbite (2020) reported that only about 10 percent of cashew produced in Nigeria receives value addition while the rest are exported in its raw form.

The considerable rise in Nigeria's cashew output has been attributed to the renewed interests of private investors, Federal and State Governments, cooperative organisations and farmers in cashew cultivation (Aliyu and Hammed, 2008). However, the increase in production has not been marched with adequate value addition, leading to loss of income (Lawal *et al*., 2011). There is still large wastage of fresh cashew apple and nuts in farms due to poor postharvest handling. Lending credence to this, Aliyu and Hammed (2008) estimated 40 – 50% losses in cashew produce was attributed to poor post-harvest handling. This wastage leads to loss of livelihood and employment opportunities.

Nigeria still earns the least international premium from the export of raw cashew nuts. Even the neighbouring Republic of Benin earns 20 percent price higher than Nigeria (USAID-Nigeria, 2002). For instance, in 2019, 1 tonne of Benin Republic's cashew nuts sold at US $815.13 (Wamucii, 2021) against similar product from Nigeria sold for US $ 744.03 per tonne (GeguMall, 2021). Small

nuts, peelability and poor post-harvest handling have been identified by USAID-Nigeria as the contributing factors to this low price. The wastage of flesh apple and nuts in several cashew farms simply because only 10 percent of cashew receives value addition needs to be halted. No matter the case, Nigeria has the potential to improve its prices to at least the same level as her West African neighbours through value addition. It is therefore expedient that value addition measures be explored to reduce these wastages and improve income generation, especially for cashew value chain actors.

Value-addition to agricultural commodity entails transforming raw farm produce into a new form(s) via processing, drying, extracting, cooling, packaging or any other type of process that distinguishes the new product from the initial one (Matthewson, 2007). The 2002 United States Farm Bill considers value addition to agricultural commodity as involving the process of transforming the physical state of the commodity via a production technique or handling method of the commodity or produce (USDA, 2013). The essence of value addition is to expand the customer base for the product, improve revenue from the sales of the derived product(s), processed, or physical separation of the commodity or product realized by the producer (US Congress, 2002).

In the context of this study, value addition to cashew comprises the processes and/or techniques of changing or transforming any of the components of cashew into a product(s) that are more acceptable to the consumers with better taste and longer shelf-life. The components of cashew that can receive value addition include nuts, kernel and apple. Adding value to these cashew components can give rise to products like cashew nut oil cake, cashew cheese, roasted cashew

kernel, cashew butter, paint, cashew nut shell liquid (CNSL), among others. Value-added cashew products are advantageous for the reason that it improves income, create opportunities for new market entry while expanding producers' marketing season and the ability to produce a new identity for their product (Matthewson, 2007). Coltrain *et al.* (2000) supported this assertion by stating that value addition is very helpful when analysing the potential of agricultural commodities for profit maximization. Profit maximisation can be actualized in a number of ways, nevertheless it involves a high-level of knowledge and specialisation because maximising revenues and minimising costs are two core concepts that must be addressed for this to happen (Kantarelis, 2007). Thus agro-processors generate consumer's value through value addition in returns for income.

Studies have shown that there are several critical factors that influence profit. For instance, Salau *et al*. (2017) examined cashew nut marketing in Kwara State, Nigeria and found a positive and significant relationship between costs associated with raw cashew acquisition, transportation, agent fee and storage and profit margin of cashew nut marketing. Cost is, therefore, a critical element of profit (Skarżyńska, 2015), cost efficiency is vital to achieving higher profit.

There are also other factors that determine profit margin of value added commodities. Dossou and Akdemir (2020) identified investment capital and variable costs as important variables influencing the profitability of agricultural commodities. Yegbemey *et al*. (2014) found investment capital to be positively correlated with the net profit of maize producers in Northern Benin. Higher investment capital enables participants to achieve economies of scale, which improves income yield (Miassi *et al*., 2019). Equally, the number of functionaries

in the cashew market determine the profit margin accruing to the individual participant. Market functionaries include producers, collectors, wholesalers, retailers and exporters participating in cashew nuts marketing (Adegbola, *et al*., 2011). Aïhounton *et al*. (2016) found that market actors in the cashew industry exert significant and positive effect on the net profit of cashew nuts marketing. Furthermore, the risk-profit trade-off fundamentally describes the proportion of profit due to risk. Boianovsky (2008) argues that profit is a reward for risk decisions in business enterprises. Jeyachitra *et al*. (2010) found a positive correlation between risk and profit. Thus, without risk, there can be no reasonable profit for the cashew processor while higher risk yields a higher profit.

In recognition of this, the Nigerian government through the Federal Ministry of Agriculture and Rural Development (FMARD) (2016) developed a policy document code name "Agriculture Promotion Policy (2016 – 2020)". The document which builds on the gains and lessons from the Agricultural Transformation Agenda (ATA) of 2012 to 2015 targets processing and value addition to export crops including cashew as one of its core components. On the broader basis, the policy seeks to collaborate with agricultural actors to build an agricultural-based economy that can meet the objectives of self-sufficiency in food production, generate foreign export earnings, and support income and job growth at a sustainable level through increase production, processing and value addition to export crops, using improved production and processing technologies. This is premised on the assumption that integrating agricultural production system into the supply chain of Nigerian and global industry will drive job creation, increase

agricultural contribution to economic growth, as well as enhance the nation's capacity to earn foreign exchange from agricultural exports.

Value addition to agricultural products can be accomplished in a number of ways, but basically, there are two main strategies, namely: creating value and capturing value. There is a distinct difference between a strategy to create value and a strategy to capture value and each strategy has specific opportunities and risks that can lead to the success or failure of value added product (Born and Bachmann, 2006).

Creating value deals with value-added strategy that meet actual or perceived customer's attributes for a superior product or service. It could be accomplished through innovation, enhancing product's characteristics, improving services, developing unique customer experience and branding (Born and Bachmann, 2006). It could also entails improving existing techniques, processes, products and services or innovating new ones. Creating value can present greater production risks than in capturing value (Fulton, 2003). Value chain actors are expected to improve their production and marketing knowledge and skills particularly, in the areas of product quality, creating brand, packaging, labeling, and regulatory requirements.

Capturing value as the name connotes entails capturing some of the value added by processing and marketing. It involves a strategy for altering the distribution and marketing of value in the food/fibre production chain basically, through coordination (Fulton, 2003). The strategy for capturing value includes direct marketing, cooperative venture, joint alliance among others. The extent of

value that can be added to any products is determined by the degree of creating and/or capturing value of the enterprise.

An enterprise adds value when it undertakes one or more series of the foregoing activities, which could be in production, processing, marketing of intermediate and/or finished goods and providing services. Additionally, an enterprise can create a value system in vertical activities such as upstream supplies and downstream channels. However, achieving a competitive advantage means that the enterprise must be involved in creating one or more activities in a manner that adds greater values to the overall benefit than its competitors. For instance, the cashew processors are creating value to cashew products when they transform raw cashew nut, apple and kernel into more unique forms that attract higher patronage which enable them to maintain an edge over their competitors.

Competitive advantage is critical for maintaining higher business performance particularly when firms or enterprises are confronted with unsteady growth and stiffer competition (Johnson and Scholes, 2004). Therefore, cashew processors must develop ingenuity for adding superior value to cashew products to outperform their competitors. Pearce and Robinson (2005) submitted that superior value is added either by pursuing low-cost production techniques or offering products with superior values (differentiation) to the buyers. Dubey (2012) noted that value addition initiatives, which focus on developing strategies for achieving sustainable competitive advantage, must incorporate strategic resources that exhibit distinctive features of uniqueness, value, ease of substitution and degree of duplicability.

Cashew processors' choice of which parts of cashew to add value is discrete considering that a typical cashew fruit comprises nut, kernel and apple. This makes the discrete choice model the most appropriate econometric tool for unravelling the factors influencing value addition as well as the effects of value addition strategies on cashew products processed in the South-East zone, Nigeria. Discrete choice models remain one of the promising areas of research (Kruk *et al*., 2010). Discrete choices unlike actual choices make it possible to include features that have not been implemented, thus provide information about the potential effectiveness of various choice options. The models enable respondents to choose their preferred option and determine the influence of each attribute on their choice (Kruk *et al*., 2010).

Some studies have used binary choice models to analyse discrete choice from a set of two discrete alternatives. Binary choice models of probit and logistic regressions have been used extensively for empirical analysis of discrete choice. For instance, Ngore (2010) employed probit regression model on the ground that value addition decision is discrete and dichotomous to evaluate factors that influenced value addition to meat products in Kenya; Agwu *et al*. (2015) used binary logit model to investigate the factors influencing value addition to cassava in Abia State, Nigeria. Kruk *et al*. (2010) employed a discrete choice experiment (DCE) of mixed logistic regression to explain rural practise preferences among medical students in Ghana. However, none of these studies used multiple choices model which is applicable in this study.

Cashew remains a major export crop and basis of livelihood to numerous smallholder farmers in the middle belt and southeastern zones of Nigeria (Topper

et al., 2001; CBN, 2005). The South East, Nigeria remains the leading cashew producing zone with four out the five States making the list of the major producing States in Nigeria. The States are: Enugu, Abia, Anambra and Imo (Ezeagu, 2002; MORGAN, 2016; Salau *et al*., 2017). However, it is worrisome that despite being the country's hub of cashew production, processing and value addition activities remain at its lowest ebb. This is seen in the absence of major large cashew processing plants in the zone. According to SBM Intelligence (2016) report, the large cashew processing companies in Nigeria include Foodpro, Olam, Esteema Abod success, Diamond, ACET Nigeria, KD Foods, and Valency which are located in Kwara, Kaduna, Ogun and Lagos.

Interestingly, value-added products can create opportunities for local processors to benefit from the economy of increasing demand for such products and to create product niches in the market. In support of this, Lawal and Jaiyeola (2007) submitted that adding value to agricultural commodities improves income generation in addition to enhancing product shelf-life. This made it imperative for this study to analyse factors and effects of value addition strategies on cashew products processed in the South-East zone, Nigeria.

1.2 Statement of the problem

Nigeria has emerged as the foremost producer of cashew in Africa and the second in the world (Adeigbe *et al*., 2015; Salau *et al*., 2017; FAO, 2018). However, the bulk of these cashew nuts (90 percent) produced in Nigeria are exported in their raw form because while only about 10 percent receive value addition (Adegbite, 2020). Additionally, the federal government of Nigeria has over the years come up with different agricultural policy interventions including

the recent "Agriculture Promotion Policy (2016 – 2020)" document, which emphasises value addition to export crops including cashew as a means of fast-tracking job and wealth creations, particularly for participants in the cashew industry. It is still unclear why cashew processors have not been able to exploit this window opportunity to enhance value addition to cashew produce. More so, despite empirical evidence that value addition is a veritable strategy for achieving competitive advantage (Mungai, 2010; de Chematony, Harris and Riley, 2015; Persson, 2015); it seems little or nothing is known about the effects of value addition strategies employed by cashew processors on competitive advantage of cashew products processed in South East zone, Nigeria. It is therefore imperative that these factors and strategies, which target opportunities for improving value addition to cashew products be identified to improve the capacity of processors to add value to cashew crop; thereby, enhancing income generation and the competitiveness of processors.

1.3 Objectives of the study

The broad objective of this study was to analyse factors, cost-benefit analysis and effects of value addition strategies on cashew products processed in the South-East zone, Nigeria. The specific objectives were to:

(i) assess the factors that influence value addition to cashew products processed in South-East zone, Nigeria;

(ii) determine the effects of value addition strategies on the competitive advantage of cashew products processed in South-East zone, Nigeria; and

(iii) determine the cost-benefit analysis, rate of return on investment, and net income of cashew products processed in South-East zone, Nigeria.

1.4 Research questions

To address the problem identified in this study in addition to achieving the objectives, the following research questions were raised:

(i) What are the factors that influence value addition to cashew products processed in the South-East zone, Nigeria?

(ii) What are the effects of value addition strategies on the competitive advantage of cashew products processed in the South-East zone, Nigeria?

(iii) What are the cost-benefit analysis, rate of return on investment, and net income of cashew products processed in the South-East zone, Nigeria?

1.5 Research hypotheses

The following null hypotheses have been formulated to guide the study:

H_{01}: There are no factors that influence value addition to cashew products processed in the South-East zone, Nigeria.

H_{02}: Value addition strategies have no significant effect on the competitive advantage of cashew products processed in South East, Nigeria.

H_{03}: There is no net incomes differential across cashew processors adding value to cashew products processed in the South-East zone, Nigeria.

1.6 Justification/significance of the study

The study was conducted in the South-East zone, Nigeria. The choice of this zone was deemed appropriate given its antecedent as a major cashew producing zone with four out of the five States of the zone being among the major

cashew producing States in Nigeria (Lawal *et al*., 2011; MORGAN, 2016). So far, the findings of this study are anticipated to benefit policy makers, the government, development partners, potential agro-investors, processors, producers and researchers.

It is expected that the findings of this study will provoke discourse for the development of a specific policy for improving value addition to cashew products in Nigeria, considering its high prospect as export products for foreign exchange earnings. The government stands to gain increase revenue generation from value-added cashew products through taxes and foreign exchange earnings. Thus the findings will serve as a policy guide for policy makers, the government and partner agencies who are interested in promoting value addition in the cashew industry.

More so, the outcomes of this study will be useful to cashew processing entrepreneurs because by highlighting the effects of value addition strategies on competitive advantage, it equips them with most viable strategies for achieving competitive advantage from value-added cashew products. Thus it arms them with guide for designing strategic policy for achieving competitive advantage in micro, small and medium scale agro-enterprises. Applying the identified strategies will enable the processors to increase sales revenues and appropriate higher profits from value addition to cashew products. The increase volume of value addition activities means that cashew producers will gear-up for increase demand with a higher income generation. Furthermore, the findings on return on investment, variability and other economic indices will provide potential investors with a guide for making an informed investment decision on cashew value addition enterprise. The fact that many of the small & medium scale investors often lack the technical

and managerial competence required for carrying out feasibility study makes this study very imperative. Besides, adding to the pool of literature on the subject matter, the findings will provide reference materials for future researchers who may be interested in carrying out related studies.

The findings of this study are also expected to pave way for further research into value addition to cashew by-products and wastes, such as cashew butter, from broken nuts, CNSL for industrial and medicinal purposes and the juice of the cashew apple that can be further processed. This will make way for entrant of new investors into the cashew value chain industry. Thereby, reducing wastages, postharvest losses and opening a new frontier for more job opportunities, income generation and greater participation of rural households in the cashew value chain industry.

1.7 Limitation and scope of the study

This study was limited to the South-East zone of Nigeria; although cashew is grown in almost every zone of Nigeria. The choice of this zone is predicated on the fact that it is a major cashew producing zone with four out of the five States of the zone being among the major cashew producing States in Nigeria (MORGAN, 2016; Salau *et al*., 2017). Granting that the Agriculture Promotion Policy (2016-2020) document of the Federal Government of Nigeria emphasizes value addition to export crops such as cocoa, rubber, cotton, groundnut, sesame, among others, cashew was chosen because only 10 percent of Nigerian cashew receive value addition (Adegbite, 2020). This situation has placed Nigeria and other African countries, which grow over 50 percent of the global cashew at disadvantage of

losing out of the booming wealth of opportunities in the global cashew market despite the growing global demand for value-added cashew products.

1.8 Theoretical framework

The decision-making basis for maximizing expected utility in agricultural enterprises is anchored on production, consumption and labour units. Studies have identified profit-maximising model and utility maximising theory as among the critical theoretical models that provide explanations for agro-entrepreneur decisions on production, consumption and valuation (pricing) (Mendola, 2007; Adeyemo and Okoruwa, 2018). However, to cover the scope and objectives of this study, a third theoretical model known as the value-based theory of strategy will be introduced into the study. Thus the three theories that provide theoretical explanations for this study are the neoclassical theory of firm, value-based theory of strategy and utility maximization theory. These theories complemented one another in providing adequate and complete theoretical framework for this study.

1.8.1 The neoclassical theory of firm

The Neoclassical Theory of the Firm in its elementary form, considers a business entity as a black box rational entity. Among the foremost proponents of this theory are Alfred Marshal (1921); Holmstrom and Tirole (1989); Jensen and Mecking (1976). The theory is premised on conceivable production and demand functions, on the basis of the principal of profit maximisation wherein profit is maximised when marginal revenue is equal to marginal cost. Profit maximisation model postulates that business entities exist and operate with the sole aim of making a profit. The entities can obtain a higher profit by increasing products'

sales at higher prices and/or by cutting costs associated with production (Kantarelis, 2007). This they can do better if they are able to create more customer's satisfying value in their products and services more than their competitors can do.

Basically, business entities exist to satisfy the needs of the society. To meet these societal needs, they engage in diverse economic activities such as identifying consumers' needs and developing a technique or process on how to satisfy the needs; making the right decisions with respect to procuring inputs to enable them deliver its recipe at the lowest possible cost; and continuously and deliberately evolve strategies for achieving competitive advantage on continuous basis (Brueckner, 2013).

Cashew processors engage in production activities of value addition to cashew products to meet societal needs. Value addition involves the processes of transforming raw cashew into products that meet consumer's taste and preference. By so doing, the processors generate consumer's satisfaction in return for income that is distributed to all participants in the value chain. The difference between revenue and cost give rise to profit. This theory is considered apt for this study because it was able to establish that processors undertake value addition to cashew products as a means of meeting consumer's needs in return for profit. It is the extent and degree of value addition to cashew products that determine the amount of profit accruing to a processor. Thus higher profits will motivate the processors to intensify value addition to cashew products. The inability of this theory in providing theoretical explanations on how value addition strategies have impacted

on competitive advantage; and factors that influence value addition to cashew products necessitated the introduction of the subsequent theories.

1.8.2 Value-based theory of strategy

The value-based theory of strategy as propounded by Brandenburger and Stuart in 1996 provided another theoretical framework for complementing the inadequacy observed in the neoclassical theory of firm. The theory postulates that business entity makes profits through a value addition process, well-defined as a cooperative game among a suitable set of suppliers (inputs suppliers), business entity (who process the inputs into products), as well as consumers (who derive values from consumption of the products transformed by the business entity). In the setting defined by these participants, a business entities in this case is the cashew processors will continue to add value to cashew product for as long as the consumers are ready to pay a price that is higher than the economic cost of the inputs employed by the processors' to produce that product. The economic cost of the inputs consists of the sum the suppliers are willing to receive for their inputs.

This theory provides that a processor can appropriate a share of profit if and only when value is added, implying that creating more value than any other processors in the industry positions processor's to achieve a higher profit and competitive advantage. It is important to note that since every input is determined at its economic cost, appropriating value amounts to earning economic rents (profits) for suppliers' equity capital, and the residual income arising due to value addition goes to the processors. Specifically, any suppliers, processors, or buyers that create any sorts of value earns commensurate economic rents or profits.

MacDonald and Ryall (2002) in their study, demonstrated that value addition is the only required strategy for determining economic value. To be guaranteed a share of the value added, which equates to competitive advantage, the processor has to create a higher value by exploiting a sustained supplier-processor-consumer alliance that offers consumers or suppliers at best a superior deal that far exceeds what they are receiving in their present alliance (Moreton, 2004). The main characteristic of a processor that sufficiently measure up with this condition is his abilities to convert inputs into products that sufficiently match either the inputs of the suppliers or satisfy the desires of the consumers to always guarantee his/her participation in the alliance that allows him to reap certain portions of the economic rents.

MacDonald and Ryall (2002) observed that value addition creates opportunities that are considered as the primitives of the game. In this theory, specifying the supplier-processor-buyer value chain can be liken to Porter's (1980) five-force position model. However, it has advantage over the positioning analysis because it offers a better tangible characterisation of the bargaining power of every actor in the industry. Brandenburger and Stuart (1996) submitted that the theory is useful for developing strategy which enables business organisations to evaluate viable alternative perspectives. This makes this theory appropriate for this study because it sufficiently establish business entity makes profits through a value addition process that involves a set of participants. The amount of profit or rent which each participant in the value chain appropriates is a function of the degree of value it can create along the value chain, by exploiting a sustained supplier-processor-consumer alliance that offers consumers or suppliers at best a superior

deal that far exceeds what they are receiving in their present alliance. By so doing, the cashew processors to achieve competitive advantage.

1.8.3 Utility maximization theory

Lastly, utility maximization theory was applied. The proponents of this theory are J. Bentham (1789); J.S. Mill (1861); and J.E. Crimmins and D.G. Long (2012). The utility maximising theory examines decision making of an agro-entrepreneur as a business owner. It provides explanation on how agro-entrepreneurs make decisions regarding production and consumption conditional on a set of constraints. Cashew processors have to make production decisions such as procurement of processing inputs, degree of value addition, distribution and marketing of value-added cashew products based on expected utility of income generations (utility maximisation theory). Therefore, production and consumption choices are captured in this theory.

The theory posits that processors desire to maximise utility (profit) conditional on a set of limitations. These limitations are production/ processing constraints, income constraints as well as time constraints. Thus, the processor decision to add value to his products is contingent on his desire to achieve the expected utility of profit from value-added cashew products, which is conditional on these set of constraints. The expected utility best describes the decision of agro-entrepreneur to engage or invest in pecuniary activities such as cashew value addition (Meyer, 2002). Although utility cannot be observed directly, however, the choices made by economic agents like the consumers can help in determining it.

The processors are considered as Decision Making Units (DMUs), choosing amongst uncertain possibilities by assessing expected utilities from every

option. The consequences of these decisions lead to improved welfare, income, or profit. Consequently, the decision to add value to cashew is realised if the expected utility for value-added cashew products is superior to the utility for non-value-added products. The utility is compensated through consumers' patronage.

Ultimately, the outcomes of value addition are to increase sales leading to profit maximization. This in turn will translate to an expansion of the enterprise, which ultimately leads to the employment of more labour while the exported products will enhance the foreign exchange earnings of the country. Overall, the theory is considered apt for this study because it is able to pinpoint that the underlying factors that influence value addition to cashew products is the expected profit which is will be higher if value is added. The theory is mathematically illustrated as follows:

Assuming that U_i and U_k stand for a cashew processor's utility for two choices, namely; adding value '*i*' and not adding value '*k*', the linear random utility model for the two choices is stated thus:

$$Ui = \beta_i X_i + \epsilon_i \; And \quad U_k = \beta_k + \epsilon_k \ldots\ldots\ldots\ldots\ldots\ldots \; 1.1$$

Where U_i and U_k are expected utility from value-added and non-value-added choices '*i*' and '*k*', β_i and β_k are the estimated parameters, while ϵ_i and ϵ_k are stochastic error terms considered to be autonomously identically distributed. If a cashew processor decides to choose choice *i*, it presupposes that the expected utility of adding value to choice *i* is higher than that of other choices (e.g. *k*). This is mathematically expressed as:

$$Ui\ (\beta_i X_i + \epsilon_i) > U_k\ (\beta_k X_k + \epsilon_k) \ldots\ldots\ldots\ldots\ldots \; 1.2$$

The chance that the processor will prefer to add value, i.e. the choice '*i*' can be stated as,

$$P(Y = 1|X) = P(U_i > U_k) \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.3$$

$$P(\beta iXi + \epsilon_i - \beta_k X_k + \epsilon_k > 0|X) \ldots\ldots\ldots\ldots\ldots 1.4$$

$$P(\beta iXi - \beta_k X_k + \epsilon_i - \epsilon_k > 0|X) \ldots\ldots\ldots\ldots\ldots 1.5$$

$$P(X^i * X_i + \epsilon^i * > 0|X = F(\beta_i * X_i) \ldots\ldots\ldots\ldots 1.6$$

Where '*P*' is the probability function, U_i and U_k have been defined above, $\epsilon_i - \epsilon_k$ are random stochastic error term, *ß´* is a vector of unknown parameter which represents the net influence of the predictor variables on the choice to add value, while *F*(*ß´Xi*) represents the cumulative distribution function of estimate '*ß´Xi*'. The precise distribution of 'F' depends on the distribution of the random error term. Based on the distribution of this error term, many other qualitative choice models can be estimated (Greene, 2012).

This theory is most appropriate for this study because it fits into the multinomial choice model that was used to analyse factors that influence value addition to cashew products. Multinomial logistic regression is useful for predicting the probabilities of diverse possible outcomes from a categorically distributed dependent variable, given a set of predictor variables (Greene, 2012). The model is employed to elucidate discrete choices, i.e. when the number of choices available is more than two and is mutually exclusive (van Dijk *et al*., 2007; Greene, 2012). In other words, it is a model that is employed to forecast the chances of the various potential results of an unconditionally distributed response variable, considering the set of predictor variables (which can be binary-valued, categorical-valued, or real-valued).

The multinomial logistic model is a type of unordered choice model that can be aggravated by a random utility model with the postulation that respondents maximize their utility in their decision making (Greene, 2000). In the MNL model, one group of the response variables is chosen as the reference (base) category. The person has to decide the best option among diverse as well as exclusive options. A utility level could be clearly outlined for each option; in addition, the person is expected to select the option with the maximum level of utility.

The utility and the choice are mainly determined from the cashew processor's standpoint. The study assumes that the factors that influence value addition to cashew products are in random form, because some of the determinants of the utility are unobserved, which suggests that the choice can only be determined in terms of probabilities. For every rational processor, his choice for a particular cashew product to add value must be such that the utility derived ought to be significantly greater than the utility derived from the reference or base category (Greene, 2000).

For a clear illustration of the multinomial logistic model, let '*y*' be designed as a random variable that takes the values {1,2….j} for choices j, a positive integer, while '*x'* represents a set of conditioning variables. In this regard, '*y*' denotes the choice of value-added in the course of processing cashew products in the South-East zone of Nigeria. It is assumed that every processor has to choose from among a set of discrete, and mutually exclusive choices of cashew products to add value (this implies that an individual precisely opts for one option out of many options, not more than or less than). These measures appear to depend on factors of '*x*'. As a result, '*x*' denotes a set of independent variables influencing

value addition to cashew products. However, it is important to ask how, if all things are equal, alterations in the components of '*x'* can influence the response probabilities p(y=j/x), *j* = 1, 2…. k. The likelihood that a processor '*i*' will opt for adding value to alternative product '*j*' among the set of cashew products is expressed mathematically as:

$$P\,(y=j/x) = P\,(U_{ij} > U_{ik}/x) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1.7$$

Where: U_{ij} and U_{ik} are the perceived utilities by processor '*i*' of choice of product value addition alternatives '*j*' and '*k*' correspondingly to X_1 being the vector of explanatory variables. The MNL model has response likelihoods:

$$P\,(y = j / x) = \frac{\exp^{(\chi_i \beta_j)}}{1 + \sum_{\kappa=1}^{j} \exp^{(\chi_i \beta_k)} j = 1, \ldots\ldots, j} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.8$$

Where: $\beta_j = K \times 1, j = 1 \ldots\ldots\ldots j$

For the probability of being in the reference category,

$$Pr\,(Yi = 0) = \frac{1}{[1 + \sum_{j=1}^{K} exp^{(\beta j X i)}]} \; j = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1.9$$

The impartial and reliable parameter estimates of multinomial logistic regression model are based on the assumption of Independence of Irrelevant Alternatives (*IIA*). This assumption supposes that the odds of choosing a particular choice over another do not depend on the presence or absence of other 'irrelevant alternatives' (Greene, 2012). For instance, the relative probabilities of choosing to add value to cashew nut or kernel will not change if adding value to cashew apple

is added as an additional choice. More specifically, the *IIA* assumption requires that the probability of choosing a particular cashew product for value addition by a processor needs to be independent of the probability of choosing another product for value addition (that is, P_j/P_k is independent of the remaining probabilities). The *IIA* hypothesis is a core hypothesis in rational choice theory.

CHAPTER TWO

LITERATURE REVIEW

2.1 History of Cashew in Nigeria

The Portuguese merchants were the first that brought cashew to Nigeria in the 16th century (Adeigbe *et al*., 2015). Available evidence reveals that it was initially cultivated in Agege, Lagos State, and thereafter, it spreads to other areas of Nigeria via human propagation activity. For over four hundred years since cashew was brought to Nigeria, the crop has been cultivated principally for nut; without any industrial attention given to the fruity (Aliyu, 2012). Several of the crops grew within the wild where it is used for aforestation and erosion management project notably within the escarpment areas of Udi in the then Anambra State (Adeigbe *et al*., 2015).

The first industrial cashew plantation in Nigeria was set up in the mid 1950 at Ogbe, Oji, Udi and Mbala by the defunct Eastern Nigeria Development Corporation (ENDC) and Iwo, Eruwa and Upper Ogun by the then Western Nigeria Development Corporation (WNDC) (Asogwa *et al*., 2009). These plantations were set up mainly with Indian cashew varieties. The success achieved in cashew trade then was low as a result of the lack of proper attention and poor management of the plantations (Adeigbe *et al*., 2015). With the participation of agro-investors, Federal and State Governments, and wealthy farmers, additional fruity were gotten in 1978, 1980 and 1982 from Asian nations, Tanzania, Mozambique and Brazil to enlarged cashew genetic base of the nation (Adeigbe *et al*., 2015).

Nowadays, cashew plantation is seen in every State in Nigeria with improvement in processing technique, shipment and commercialised activities. The main cashew growing States in Nigeria based on the level of output in relation to the various zones of the nation include: Enugu, Abia, Imo, Anambra, Ebonyi and Cross River States within the South east and South-south zones; Oyo, Osun, Ondo, Ekiti and Ogun States within the South west zone, Kwara, Kogi, Nassarawa, Benue, Taraba, Niger, Federal Capital Territory (Abuja), Kaduna and upland within the Middle Belt, Kebbi and Sokoto States within the North-west zone of Nigeria (USAID-Nigeria, 2002; Ezeagu, 2002; Adeigbe *et al*., 2015). It is worthy to note that the bulk of exported raw cashew nuts are from the South West and South-East zones of Nigeria.

2.1.2 Cashew nut production in Nigeria

Cashew is a tree crop (*Anacardium occidentale*) that is cultivated widely in the coastal areas of the tropics (Lawal *et al*., 2011). It is a single-trunk tree that spreads in habit up to 10-12m tall. In matured trees, the spread-out could be larger than the height, with lower limbs bending toward the bottom. Morphologically, the architect of *Anacardium occidentale* makes it's a principal tree crop for recovering degraded lands because it impedes the manifestation of desert encroachment and erosion menace. More so, the capability of cashew crop to be grown on poorly drained soil in addition to the practice of intercropping it with other food crops makes it a perfect crop for smallholder farmers. Thus, it is a versatile crop with amazing economic benefits especially in developing nations (Adeigbe *et al*., 2015). For instance, the varied components of the fruits are valuable. These are the nut, apple, and kernel.

In the last two decades, Nigeria recorded a tremendous increase in yearly cashew output with approximately 500,000 MT in 2000 which rose to close to 1 million MT in 2017 (FAOSTAT, 2019). Nigeria produces over 40 percent of African output (FAOSTAT, 2013). Africa contributes about forty to fifth percent of the world cashew output. Apart from Nigeria, Cote d'Ivoire, Guinea-Bissau, Mozambique, and Tanzania are also notable for cashew production in Africa (Adeigbe *et al*., 2015). Nigeria has emerged as the leading producer of cashew nut in Africa in the past decade, accounting for approximately half the African output and second at the world level (Figure 2.1) (Adeigbe *et al*., 2015; FAOSTAT, 2019).

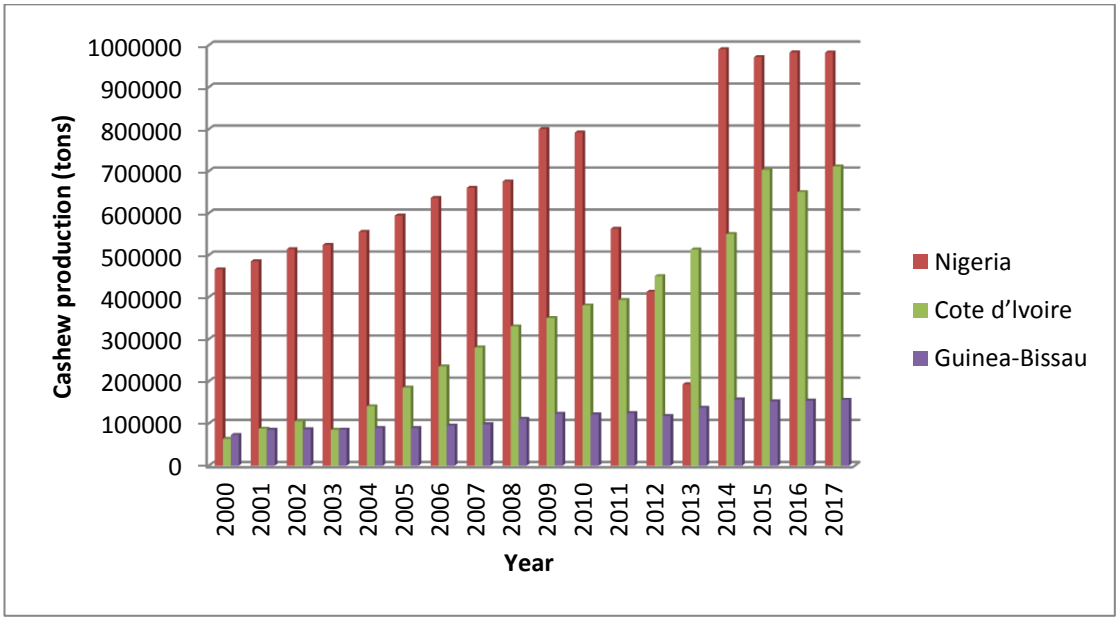

Figure 2.1: Cashew production in Nigeria, Cote d'Ivoire and Guinea-Bissau (2000 – 2017)
Source: FAOSTAT (2019)

A comparative analysis of cashew production in the last two decades shows that out of the three leading cashew producing countries in Africa, Nigeria led in most of these years except for 2012 and 2013 when Cote d'Ivoire led (figure 2.1).

Nevertheless, Nigeria regained her first position soon after 2014 and led up to 2017. Cote d'Ivoire maintains a consistent second position and closely followed by Guinea-Bissau in the third position (FAOSTAT, 2019).

A review of cashew cultivation in Nigeria within 2001 showed that a little lower than 20 percent of the cultivable lands were put into cashew production in several of the States where cashew is produced in Nigeria (Topper *et al*., 2001). Daramola *et al*. (2006) observed that it is only about 34.2 million hectares (approximately 48 percent) of the tillable surface area (71.2 million hectares) have being cultivated out of the overall Nigerian surface area of 98.3 million hectares. This suggests that there is an opportunity for a further increase in cashew production in Nigeria. Nigeria has what it takes to emerge as the global leading cashew producing nation if additional land is provided for the farming of improved quality and better yielding genotypes.

2.2 Concept of value addition

Value addition is a phrase that often features in the discourse of future profit-making in an agricultural enterprise. The term gained prominence in the Nineteen Nineties to the level that it is now a catchphrase for improving income generation. Broadly speaking, value addition is the act of changing a raw product from its unprocessed form to a more appreciable form. Several raw agricultural produce have inherent value in their unprocessed form. For instance, when corn is matured is harvested, kept on the farm and later used as feed for the farm animals. By this, it has added value at the farm level. The truth is that value has been added as soon as it is used as feed for the animal because the maize taken by the animals is transformed into protein or meat. The benefit of the transformed product is value

addition, like converting maize into flour. It is pertinent to note value addition activities that will support the required investment in research and development, processing, and marketing (Coltrain *et al*., 2000).

The construct of value-adding is useful in assessing the prospect of profiting in an agricultural enterprise (Coltrain *et al*., 2000). Cucagna and Goldsmith (2018) citing Coltrain *et al*. (2000) offer a definite conceptualization by illustrating value addition in an agricultural enterprise. They stated that economic value addition to farm commodity (e.g. maize) entails changing it into any other product (like flour/or bread) that is more desirable by customers. The 2002 US Farm Bill conceives value addition to agricultural product as modification in the original form of any farm produce via a production technique or handling method by which the agricultural product is transformed and differentiated (USDA, 2013). The essence of value addition is to increase the customers' choices for the merchant, and accrue greater sales revenue from the transformed product (U.S. Congress, 2002).

Amanor-Boadu (2003) integrated the activity concept with profit measurement. He tries to conceptualize value addition by identifying two circumstances that value-adding activity should meet. Firstly, is a firm engaging in activity that historically has been done by any other further along the value chain; and/or secondly, if a firm is compensated for carrying out activity those other firms have in no way done within the value chain (Amanor-Boadu, 2003; Evans 2006). The two activities confirm the activity concept. Amanor-Boadu further added that if the overall profit of the business organizations is not enhanced by adding value to the product, the activities of the firms are considered to contribute no value to

the actors along the value-chain, and so fall short of the criteria of a value-adding activity (Amanor-Boadu, 2003). Therefore, value addition should not solely be an intermediate activity (Coltrain, 2000), but also profitable.

2.2.1 Cashew processing and value addition

The cashew processing industry in Nigeria is essentially characterized by small-scale processors, using mainly traditional technique. The technique involves the harvest of cashew fruit before it drops to the ground to avoid pilfering and apple deterioration. The practice most times leads to poor kernels' quality (Olubode *et al*., 2018). The prevalence of traditional processing techniques hinders the expansion of cashew processing industry in Nigeria. Even where improved technology exists, it is highly under-utilized. Laying credence to this, SBM Intelligence (2016) opined that cashew processors in Nigeria are operating below thirty percent of the installed combined capacity of forty-eight thousand tons (attributable mainly to the high price of procuring raw cashew nut and epileptic power supply). However, the high-quality nut can be gotten once the nut is severed from newly dropped cashew apples and dried under the sun to reduce the moist content from twenty-five to eighty percent (Asogwa *et al*., 2008). The drying method facilitates the retention of flavour and quality of the kernels. The nut is mostly assembled on weekly basis throughout the harvest season. However, once cashew apple is harvested for processing, it is normally processed prior to dropping (Asogwa *et al*., 2008).

Cashew processing techniques have gone through different stages of development over the years, with the latest being the use of automated machines at certain levels of processing, and diversification of operational techniques in

developed nations to satisfy environmental requirements as well as production strength. The entire processes target the extraction of as much kernel as possible from the shell. This process was previously carried out using a manual technique, as it is still the case with small-scale processors, while large scale processors have advanced to mechanized processing techniques. Not minding the discrepancies in the available processing methods, Olubode *et al*. (2018) identified five major steps that are common (Figure 2.2). These steps are outlined as follows:

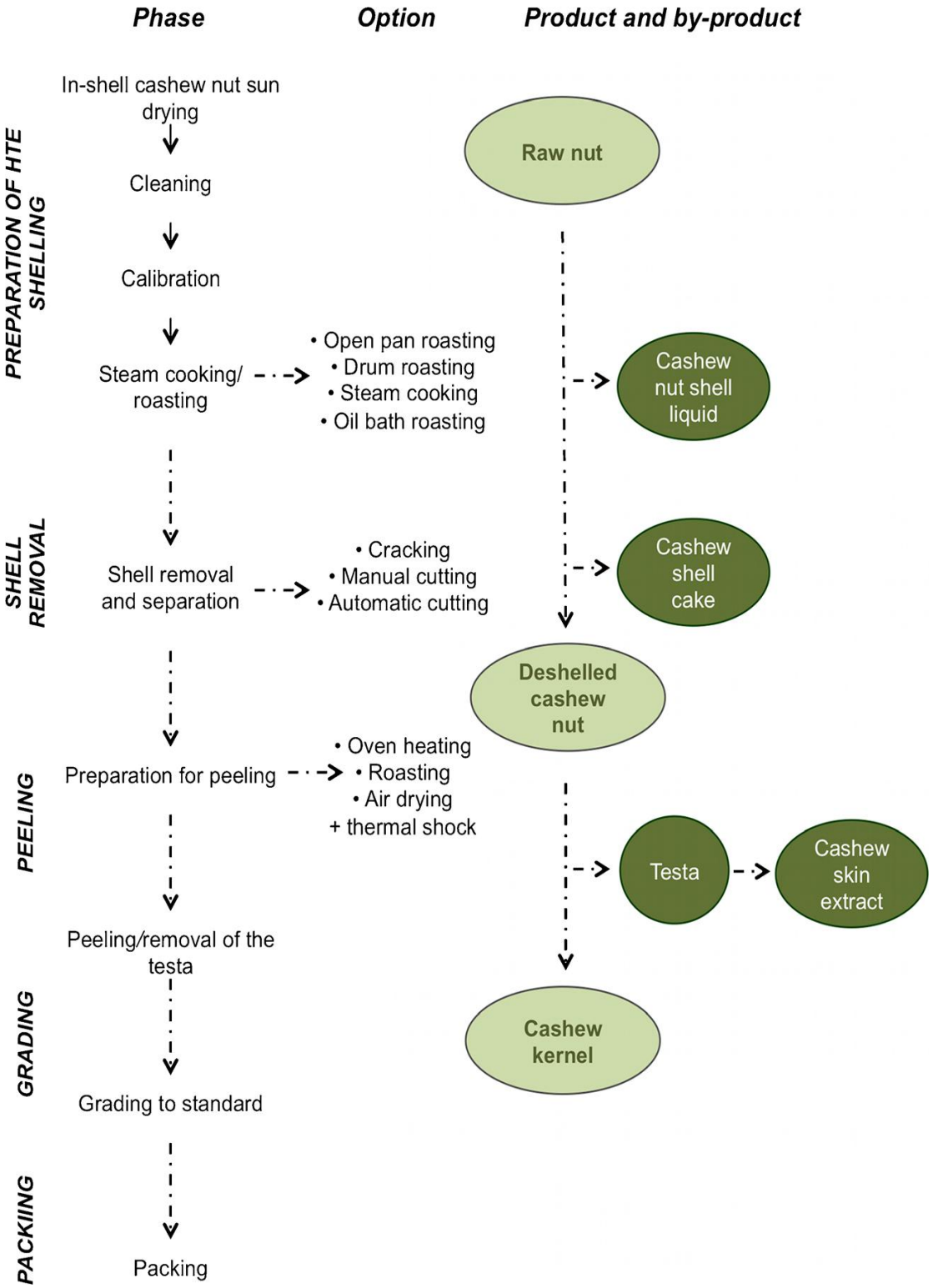

Figure 2.2: Flowchart of cashew nut processing

Source: Olubode *et al*. (2018)

(i) Preparation of the in-shell: this is done at the cleanup section to get rid of contaminant, then standardization and grading of nut into related sizes which will be equally processed thereafter. Once it will not be processed manually, it can be carried out with the aid of extractor fans and rotating cylinders. The cashew nut is further subjected to heat treatment to enhance the brittleness of the shell, in addition, to loosen the kernel from the shell. This can be actualised through heat treatment (roasting), and followed by drenching of the nut to increase moist content by up to fifteen to twenty-five percent to forestall heat scorching. The earlier technique is widely used in Brazil in form of oil bath roasting that enhances optimal recuperation of the CNSL once it is discharged at this phase, although it needs greater equipment cost. The last method is common in Africa and Asian countries. The nut is subjected to static or spinning heat vapour for 15–25 mins at 0.75–5 kg cm^{-2} (Mohod *et al*. 2010; Fitzpatrick, 2011).

(ii) Removal of the shell: this can be carried out manually by cracking or automatically, by cutting. Manual cutting in addition to steam cooking yields the best proportion of total cut (up to ninety-nine percent). Traditionally, manual cutting has been used for ages as a technique for removing the shell with the aid of a pocket knife and is still be utilized by many small-scale processors. This technique has been found to be harmful to the processor, because the CNSL splashes out of the shell into the skin, thereby constituting a health hazard because of the caustic substance in it. Automated cutting is used in large scale factories with the help of shelling equipment plus a conveyor machine.

(iii) Peeling: it involves the step needed to get rid of the seed coat that's created brittle which is simply removed by subjecting it to oven heat appliance or roasting

of the nut. In some geographical regions, oven air drying is quickly accompanied by a steam of heat shockwave carried out at heat compartments. Peeling is immediately performed using manual technique or by peeling machines with the aid of compressors, mainly with manual finishing to enhance the yield of complete peeling of nut (Fitzpatrick, 2011).

(iv) Grading: cashew kernels are grouped according to sizes and colour. This process is usually carried out using manual or mechanical equipment like drum or roller graders that choose a complete nut that has industrial value in the global market and/or broken-down items probably appropriate for domestic markets.

(v) Packing: cashew kernel is normally cleaned using aspirators typically available in tiny processors unit and packaged via vacuum and gas flushing package to increase the life span of the products (Fitzpatrick, 2011).

The three major cashew products sold in the global arena are: raw nuts, cashew kernels and cashew nut shell liquid (CNSL). Although, UNIDO (2011) noted that the major output from the cashew value chain is the raw nuts. The 4th product, the apple is typically processed for local consumption. Presently, about eighty percent of cashew nut produced in Nigeria is exported in the raw form, because not many firms are engaged in the transformation of the commodity (Salau *et al*., 2017). The production of raw cashew nuts majorly for export by farmers at a very low premium undermines growth in the cashew industry. This situation hampers the actualization of the Action Plan for the Nigerian cashew industry commissioned by USAID and the Nigerian government in 2002. The Action Plan is to transform Nigeria from an underpriced cashew producing country to supply and export high-quality cashew products (USAID-Nigeria, 2002).

Meanwhile, there are numerous by-products obtained from raw cashew in addition to the shells that are wasted. The cashew apple is processed into many products; however, not many of these products are presently exploited. The possibility of using cashew apples to produce wines, juice, pickles, marmalades, as well as ethanol is high (Honorata *et al*., 2007; UNIDO, 2011). Other cashew producing nations like India and Brazil have substantially employed the use of these by-products to improve the general production and processing efficiencies. More so, the potential exists for improving the profitability of cashew processing in Nigeria by expanding the range of cashew products, in addition to commercialising the use of readily available waste and by-products.

2.3 Factors influencing value addition to agricultural commodities

Several studies have identified socio-economic variables as the central factors influencing value addition to agricultural commodities. One of such studies is that by Agwu *et al*. (2015) who employed binary logistic regression to assess the factors influencing cassava value addition by rural agribusiness entrepreneurs in Abia state, Nigeria. Their findings suggest that sex, educational attainment, family size, income level, and farm output influence value addition to cassava products. Ngore *et al*. (2015) analysed socioeconomic variables that influenced meat value addition in Kenya and found a significant correlation between education attainment and age with value addition choice.

Badri, Tabrizi and Badri (2017) in their study identified education costs, health costs, access to credits and gross fixed capital as having a positive effect on value addition to farm produce. Mokhothu-Ogolla and Wanjau (2013) used descriptive statistics to examine factors influencing value addition to leather firms

in Kenya and found that the industry is characterized by low capacity building and unskilled labour. In another study, Popp Faminow and Parsch (1999) investigated factors influencing the decision to adopt value-added production on cow-calf farms using logit regression. They found facilities, risk and producer's perception about profitability were significant and important factors that influence value-added production on calf. Also, Mkandawire and Gathungu (2018) examined factors influencing participation of farmer-groups in value addition activities in Ntchisi District, Malawi and found animal farming, location, programme participation, gender groups and number of enterprises were significant and important determinants of farmer-groups participation in value addition. This study is a departure from the above studies because in addition to socioeconomic variables, other factors related to business strategic goal, institutional factors and product characteristics were included.

2.4 Competitive advantage

Competitive advantage is the ability of an enterprise to outpace its competitors through product differentiation or cost advantage. Ehmke (2012) defined competitive advantage as an advantage a firm or enterprise gains over other firms by offering clienteles products with higher value in the form of a lower price, unique brand of product or other benefits. Mungi (2010) conceptualized comparative advantage from the profit standpoint as the ability of a firm to sustain profits in excess of its industry's average.

Simpson, Taylor and Barker (2004) averred that competitive advantage remains the fundamental basis for developing business strategies for attaining sustainable growth. Potjanajaruwit (2018) argued that the sustainability of micro,

small and medium enterprises is only possible if they can achieve competitive advantage. The author submitted that enterprises must incorporate a procedure for value creation into their business strategic goal. Business strategies are often crafted with the objective of achieving a competitive advantage.

An enterprise or a firm can leverage its strengths to position itself to achieve a competitive advantage. Alluding to this, Mungai (2010) citing Porter (1985) opined that achieving competitive advantage from a firm or enterprise´s strengths can be viewed from the standpoint of differentiation advantage or cost advantage. Cost and differentiation advantages can be considered as positional advantages because it expresses the position of the firm in the industry either as a leader in offering products with lesser cost or highly differentiated products. This goes to show that a firm can achieve a competitive advantage when it offers similar values as its rival although at a lesser cost (cost advantage) or offer values that is greater than that of its competitors (differentiation advantage). In this regard, the business entity is able to deliver greater value to its clientele while retaining profit for the firm.

From the resource-based viewpoint, a firm or enterprise can utilise its resources as well as capacities to gain a competitive advantage that ultimately delivers superior values to the customers. Mungai (2010) maintained that having the right resources and competence can be used to achieve competitive advantage by either lowing price or differentiation of product. Thus, a firm or enterprise positions itself to achieve a competitive advantage in its industry by choosing lower cost or differentiating products. This choice is central to a firm's competitive strategy. A resource is one of the firm-specific assets that are useful for achieving

cost or differentiation advantage, which only a few competitors can obtain with ease. In contrast, competence refers to the ability of a firm to effectively utilise resources at its disposal. Competencies are well-established in the organization's customs, which are not overtly written down as procedures are more intricate to replicate by competitors. A combination of a firm's resources and capacities forms its core competencies. These competencies facilitate efficiency, innovation, quality, as well as customer responsiveness (Mungai, 2010). A firm or enterprise can leverage all of these to deliver cost advantage or differentiated advantage.

The concept of competitive advantage as applicable to this study is the ability of an individual cashew processor to offer services and/or products that meet or exceed customer's preferences more than his/her competitors. This concept suggests that achieving a competitive advantage is possible if processors are able to create cashew products that measure up with expected customers' values with distinctive attributes that distinguish them from their competitors.

2.4.1 Value addition and competitive advantage: The nexus

Fundamentally, a competitive advantage can be achieved when a firm or enterprise is able to add value to its products far beyond that of its competitors. Value in this context is that unique attributes that attracts costumers to the product, which they are willing to pay for not minding the cost (Mungai, 2010). Superior value can be achieved if a firm offers product with lesser price than its competitors for same the value or offers unique brand that far offset a higher price in its competitors' product (Mungai, 2010).

Value addition is becoming popular because increasing market competition is coercing business entities to reexamine their range of products and offer more

unique and customer-oriented products without necessary incurring higher costs (Dubey, 2012).

Value addition to agricultural commodities can be achieved in several ways, but basically, there are two major strategies, namely: creating value and capturing value. There is a distinct difference between a strategy to create value and a strategy to capture value and each strategy has specific opportunities and risks that can lead to the success or failure of value added product (Born and Bachmann, 2006).

Creating value deals with value-added strategy that meet actual or perceived customer's attributes for a superior product or service. Creating value could be accomplished through innovation, enhancing product's characteristics, improving services, developing unique customer experience and branding (Born and Bachmann, 2006). The strategy for creating value depends on products or services that are uniquely differentiate from the conventional goods. This could entails reforming current techniques, processes, products and services or innovating new ones. Creating value can present greater production risks than in capturing value (Fulton, 2003). Value chain actors are expected to enhance their production and marketing knowledge and skills particularly, in the areas of product quality, health and nutritional safety, creating brand, packaging, labeling, and other regulations.

Capturing value as the name connotes entails capturing the value created through processing and marketing. It involves a strategy for altering the distribution and marketing of value in the food/fibre production chain basically, through coordination (Fulton, 2003). The strategy for capturing value includes

direct marketing, cooperative venture and joint alliance. The extent of value that can be added to any products is determined by the degree of creating and/or capturing value of the enterprise.

An enterprise adds value when it undertakes one or more series of the above activities, which could be in production, processing, marketing of intermediate and/or finished goods and providing services. Additionally, an enterprise can create a value system in vertical activities such as upstream supplies and downstream channels. However, achieving a competitive advantage entails that the enterprise must be involved in creating one or more activities in a manner that adds more values to the overall benefit than its competitors. For instance, the cashew processors are creating value to cashew products when they transform raw cashew nut, apple and kernel into more unique forms that attract higher patronage which enable them to maintain an edge over their competitors.

Empirical studies have shown that value addition is a veritable strategy for achieving competitive advantage. For instance, de Chematony, Harris and Riley (2015) opined that value addition has gained wide application as a strategy for achieving competitive advantage. Persson (2015) found value addition to food commodities as a potential means of achieving sustainable competitive advantage. More so, Mungai (2010) averred that value addition activities are strategically designed for achieving a firm's competitive advantage.

Competitive advantage is critical for maintaining higher business performance particularly when firms or enterprises are confronted with unsteady growth and stiffer competition (Johnson and Scholes, 2004). Therefore, cashew processors as applicable to this study must develop ingenuity for adding superior

value to cashew products to outperform competitors. Pearce and Robinson (2005) submitted that superior value is added either by pursuing low-cost production techniques or offering products with superior values (differentiation) to the buyers. Dubey (2012) noted that value addition initiatives, which focus on developing strategies for achieving sustainable competitive advantage, must incorporate strategic resources that exhibit distinctive features of uniqueness, value, ease of substitution and degree of duplicability.

2.4.2 Variables of value addition strategies used in determining the competitive advantage of processed cashew products

This study reviewed extant literature on value addition strategies that relate to competitive advantage. The review revealed four (4) value addition strategies based on creation and capturing value that could lead cashew processors to achieve a competitive advantage from value-added cashew products. These strategies include quality improvement strategy, organizational growth strategy, packaging strategy, and sales strategy. These four strategies form the predictor variables used to determine the effects of value addition strategies on the competitive advantage of value-added cashew products. Empirical evidence for the use of these four value addition strategies as the determinant variables for determining competitive advantage is provided as follows:

2.4.2.1 Quality Improvement strategy

Quality improvement is a strategy for enhancing product quality and enabling the business organization to achieve a competitive advantage while meeting customer's satisfaction. This is important given the increasing consumer demand for quality products and services. Any firm or business organization that

delivers quality products/services gains competitive advantage over its rival. This aligns with the findings of Dimanche (2014) who reported that quality improvement is a viable strategy for gaining a competitive advantage in the market arena. Similarly, Hilmy (2016) averred that quality improvement is an essential strategy for achieving a competitive advantage over competitors.

Moreover, Ho (2010) argued that the application of quality improvement strategy could be used to improve the quality of products as well as enables firms to achieve competitive advantage. Demang, Salengke and Brasit (2018) submitted that product quality is vital for achieving higher prices while meeting customers' values. US Congress (2002) noted that the essence of value addition is to expand customers' range of choices over a product with the ultimate goal of increasing revenue from the derived product(s). Gharakhani, Rahmati, Farrokhi and Farahmandian (2013) observed that consumer's tastes and preferences are varying, therefore, a business organization must keep pace with these evolving demands by offering the required products' quality to the buyers.

2.4.2.2 Organizational Growth Strategy

There is increasing evidence that small scale businesses can achieve a competitive advantage if they focus on strengthening organizational growth. Cooney (2012) affirmed this by stating that small business entities are increasingly gaining a competitive advantage in the market arena. Persson (2015) affirmed that micro, small and medium enterprises (MSMEs) that are not able to compete with large business organizations can work together under cooperative or joint business arrangements, focusing on creating customer's value, and differentiated products with unique features to enable them achieve stronger competitive advantage.

Demang *et al*. (2018) reported that cashew entrepreneurs can achieve competitive advantage by organizing themselves into a joint business association, which avail members' windows of opportunities of trainings, access to fund, exchange of ideas and experiences, and improve market competitiveness. Morgan, Marsden, Miele and Morley (2010) identified business networking and cooperation as one of the entrepreneurship skills necessary for agro-entrepreneurs to achieve competitive advantage.

On the other hand, Vesala and Vesala (2010) argued that exposing agricultural firms to entrepreneurial trainings can enable them to develop skills for achieving competitive advantage. Demang *et al*. (2018) stressed that entrepreneurship training is key to ensure that organisational resources are properly channelled to areas of strength while mitigating areas of threats. They further submitted that by efficiently utilizing the organisation's resources, the small business operators can achieve competitive advantage through innovation, creativity, and efficiency.

2.4.2.3 Packaging Strategy

Branding is becoming increasingly popular for building a strong products' presence in the marketplace. There are several ways of improving the visibility of a brand and packaging is one of them. Packaging as a marketing strategy makes it easier for consumers to make a quick decision about the brand and differentiate a product from others. Thus enabling the business owner to gain a competitive advantage over other competitors. This is in tandem with the finding of Rundh (2009) that packaging strategy is fundamentally essential for achieving competitive advantage because it differentiates a firm's products from other brands and

products. Underwood, Klein and Burke (2001) argued that a product picture is part of a strategy for achieving competitive advantage. This is because pictures can easily communicate information about the product to consumers much faster than words can do.

Nikitaeva (2012) pointed out that packaging no longer serves as a mere container and protector of products but now contributes positively to sales promotion by attracting the attention of customers to the products. The competitiveness of today's business environment suggests that the use of valuable and attractive packages is critical to influencing customer's purchasing decisions. Ambrose and Harris (2011) shared this view when they stated that packaging is now another useful means of communicating a product's values to consumers. On the other hand, packaging strategy could also serve dual roles for achieving profitability and competitive advantage from value-added products.

2.4.2.4 Sales Strategy

Studies have shown that a business organization that employs sales strategies is more able to gain a competitive advantage than its competitors. For instance, Porter (2008) found a positive correlation between sales volume and competitive advantage. Guenzi and Troilo (2007) affirmed that business organizations can capitalise on increasing consumer's desire for high value-added products to gain competitive advantage by employing effective sales strategy. With an effective sales strategy, a firm can focus on creating a value-added product that meets consumer's satisfaction which enables them to outshine their competitors (Madhani, 2016). Malshe and Sohi (2009) noted that the high competitiveness of today's business environment is driving sales creativity of most business

organisations to achieve competitive advantage. Thus, the sales strategy of cashew processors was regressed against the competitive advantage of value-added cashew products.

2.5 Conceptual framework

The conceptual framework that anchors this study attempts to provide explanations on the linkages between the determinant variables that influence processors' decision to add value to cashew produce. It illustrates the interactions between the critical variables involved in this study and how they relate with one another. The framework presupposes that cashew processors' choice of value addition to cashew is influenced by predictor variables such as business strategic goals, socioeconomic variables, institutional factors and product characteristics. The business strategic goals of a processor, which could be profit maximization, product differentiation and/or increase market share can influence the decision to add value to cashew.

The socio-economic variables comprise the factors that result from influences of environmental interactions, psychological disposition and inherent human characteristics of the cashew entrepreneurs. The institutional components include the government policy especially as it affects cashew processing, access to credit, available technology for transforming the product, access to local and international markets or other key market actors (service industry) that are beyond the control of the cashew entrepreneur and availability of marketing infrastructures such as power supply, efficient transportation system, storage and telecommunication facilities among others.

Furthermore, the inherent characteristics of cashew such as perishability, breakability/brittleness, peelability, size and colour determine whether cashew investors will add value to cashew or not. The study assumes that value addition can be achieved in several ways, which generally can be classified into two, viz: creating value and capturing value. These two value addition strategies form the intervening variables that influence the predictor variables in shaping processors' decision – making regarding value addition to cashew. Based on the foregoing, the intervening variables were grouped into four value addition strategies as (i) quality improvement strategy such as hygiene requirement, meeting international trade requirement, long shelf-life and health & nutritional safety; (ii) packaging strategy like colourful/attractive package, moisture/tamper proof package and durable package. Others are: (iii) organization growth strategy involving joint group venture/cooperation, and partnership business and entrepreneurship training; (iv) sales strategy such as advertising, trade fair and exhibition, sales promotion, door-to-door sales, e-marketing, event sponsorship and point of purchase display. The response variable includes the value-added cashew products of cashew nut, cashew kernel and both cashew products.

These four categories of factors act together to influence whether cashew entrepreneurs will add value to cashew as well as the extent to which value will be added. The decision of the processors to add value to cashew fruit is based on the expected utility derivable from the products. These products are cashew nut, kernel and both cashew products. The derivable utility resulting from the transformation of any of the cashew products is usually compensated by the customers. This

activity (value addition) helps the processor to gain a competitive advantage and increase income generation by either capturing value or creating value.

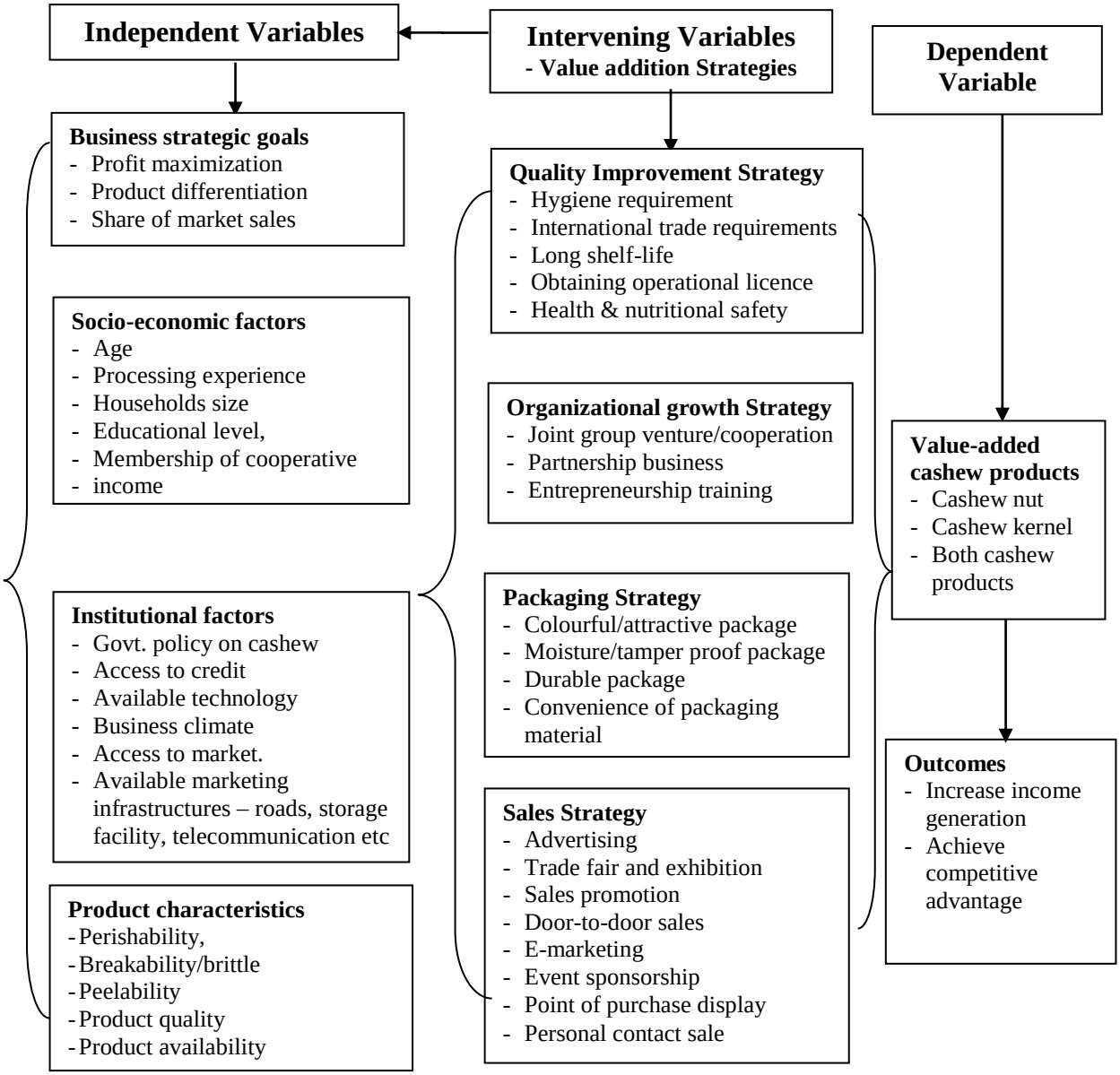

Figure 2.3: Conceptual framework

Source: Modified from Ngore (2010)

2.5 Empirical review

Ngore *et al*. (2015) analysed socioeconomic variables that influenced meat value-addition by rural agribusinesses investors in Kenya. Specifically, the objectives were to: describe the socio-economic characteristics that influenced the decision of meat agribusiness entrepreneurs to add value to their products, and identify and characterize the existing systems of value addition in rural Kenya. The study surveyed 120 butchery operators in Igembe north district using a structured questionnaire. The primary data employed for the research were analyzed using descriptive and inferential statistics. The study showed that credit, management's educational attainment and age significantly correlate with butchers' choice of meat products to add value. Consequently, the authors recommended policy intervention to increase access to credit, and improve the literacy rate of the rural agribusiness entrepreneurs via training and extension services. The authors' choice of using correlation analysis to analyse discrete and dichotomous variable of value addition to meat product is highly inappropriate and makes the findings unreliable. Correlation only shows the relationship and cannot be used to establish the possible causal effects of the socioeconomic variables on meat value addition, which would have strengthen the findings. Thus, it is very likely that the established significant correlation has no actual causal link with the variables as such the findings are unreliable.

Badri *et al*. (2015) analysed factors affecting the value addition to the agricultural sector in selected developing countries with a focus on human capital. Specifically, the study reviewed the effects of human development on value addition to agricultural sector in some emerging countries (2006 – 2014) using the

panel data. The regression model used for the study was the Ordinary Least Squares method (OLS). The finding indicated that health costs, educational costs, domestic credits to the private sector and gross fixed capital had a positive effect on value addition to agricultural sector in the period under study. They concluded that human development has a positive and meaningful effect on value-added agricultural sector. The weakness of this study stems from the use of OLS regression to analyse value addition to agriculture, which is apparently a discrete and dichotomous categorical variable. The OLS coefficients may have yielded biased and inconsistent estimates, thus, making the inferences incorrect.

Furthermore, Mokhothu-Ogolla and Wanjau (2013) analysed factors influencing value addition to leather firms in Kenya. The specific objective was to determine the influence of capacity building, technology, finance and quality control on value addition. The study adopted an exploratory approach and a case study design. A census technique was adopted to collect primary data through semi-structured questionnaires and descriptive statistics was employed to analyse the dataset. The study population comprised 35 incubatees (15 currents and 20 formers) of the Leather Development Centre at the Kenya Industrial Research and Development Institute. The results showed that leather industry is characterized by low capacity building and untrained workers. The industry used outdated technology; lack policy for upgrade of obsolete machines; and slow culture of repairs and maintenance. More so, the industry was poorly funded while quality was traded-off due to exorbitant cost of inputs. The research recommended that manufacturers should invest more resources to upgrade their human capital and technology. The industry's actors need to analyse shortcomings in the current

national policy programme, and provide remedies. The weakness of this study arises from the choice of the researchers to use descriptive statistics to analyse the data. Value addition to leather is a binary outcome variable and ought to have been modelled using binary regression, which should have predicted the probability of adding value to leather or otherwise. Consequently, the findings are defective and unreliable.

Lawal *et al*. (2011) analysed the profitability of value addition to cashew farming families in Kogi State, Nigeria. Specifically, the objective examined costs and returns to farming families engaged in adding value to cashew. The study employed multistage random and purposive sampling techniques to sample 150 farmers. The study employed descriptive and inferential statistics to analysed the survey data. The findings showed that cashew value addition activities of the respondents were grading of kernels, heat treatment, shelled roasted as well as packaged. The apple was squashed, processed into juice, and packaged for market. More so, the net income of farmers adding value (US$487.26) differs significantly ($P<0.05$) from non-value adders (US$306.29). The value of 1:2.30 was achieved as the benefit-cost ratio among farmers adding value. They concluded that adding value to cashew is essential for increasing the income of households. The study is merely descriptive in its approach and focused on determining profitability using gross margin analysis and benefit-cost ratio among farming households. This current study went a step further to analyse the return to investment and variability inherent in the various cashew enterprises.

In their study, Mamo, Tefera and Byre (2014) examined factors that influence urban and peri-urban dairy producers' participation in milk value

addition and volume of milk value added (VMVA) in Welmera Woreda, Ethiopia. With the use of a structured questionnaire, primary data were gathered from 120 multistage randomly selected respondents while two-step Heckman regression was employed to analyse the data. The findings showed that sex, education of household head, age, market distance, number of local milking cows and quantity of annual milk production influence positively the likelihood of engaging in value addition in the first step. In the second step, sex of household head, income from non-dairy activities, distance to market, number of local milking cows and quantity of annual milk production positively influenced the VMVA, whereas the number of children who are less than 6 years old as well as number of crossbred milking cows negatively influenced it. The study recommended expansion of rural education and developing mechanisms for exchange of experience between older and younger farmers. Infrastructural upgrade as well as the use of processing machines will improve the sale of raw milk and value addition respectively. Despite the merit of this study, there is a geographical and methodological differences between it and the current study. Firstly, while the study was conducted in Ethiopia, the study location of the current study is Nigeria. Secondly, two-step Heckman regression was employed to analysed the data, multinomial logistic regression was applied for this current study.

2.6 Criticism and research gap

The reviewed literature showed that studies on factors affecting value addition have been carried out in the leather industry in Kenya (Mokhothu-Ogolla and Wanjau, 2013); agricultural sector in selected developing countries with emphasis on human capital (Badri *et al*., 2015); meat industry in Kenya (Ngore *et*

al., 2015); cassava crop in Abia State, Nigeria (Agwu *et al*., 2015); and the closest dwelled on cashew farming households in Kogi State, Nigeria (Lawal *et al*., 2011), which differs from the focus of this study. However, none of these studies analysed factors and effects of value addition strategies on competitive advantage of cashew products processed in the South-East zone, Nigeria, which is the focus of this study. Despite empirical evidence that value addition is a veritable strategy for achieving competitive advantage (Mungai, 2010; de Chematony, Harris and Riley, 2015; Persson, 2015); it seems little or nothing is known about the effects of value addition strategies employed by cashew processors on competitive advantage of cashew products processed in South East zone, Nigeria.

More so, empirical evidence suggests that scholars have given extensive attention to agronomy of cashew production (Asogwa *et al*., 2008) and marketing of raw cashew nut (Hammed *et al.*, 2008; Lawal *et al*., 2011; Salau *et al*., 2017), with little or no attention given to value addition to cashew products processed in Nigeria. To bridge this knowledge gap, this study set out to analyse factors and effects of value addition strategies on cashew products processed in the South-East zone, Nigeria.

CHAPTER THREE

METHODOLOGY

3.1 Research design

The research design employed for this study was a cross-sectional survey design. This is a kind of research design that allows the researcher to analyse data obtained from a populace or representative subset at a particular moment in time. In other words, a cross-sectional survey design enables the researcher to collect data and make inferences about a population of interest at a point in time. This type of survey is appropriate for this study because according to Rubin and Babbie (2005); Eboh (2009), it is possibly the best method of research design that social scientists who are interested in generating first-hand information for describing a populace that is enormous to be observed straightforwardly. The design facilitated the collection of quantitative data using questionnaire instrument.

3.2 Area of study

The study was conducted in the South-East zone, Nigeria. The area is one of the six geo-political zones in Nigeria and comprises five States, namely; Anambra, Imo, Abia, Enugu, and Ebonyi. The area has a population of 16.4 million inhabitants, mostly Igbos (NPC, 2006). It has a landmass of about 58,214.7 km^3 and lies between longitudes $6^0\ 50^I$ and $8^0\ 30^I$ E latitudes $4^0\ 30^I$ and $7^0\ 5^I$ N. South-East zone, Nigeria is bordered in the east by Cross-River State, Delta State in the west, Kogi and Benue States in the north, and Akwa-Ibom and Rivers States in the south. The zone lies within the rainforest and derived savannah regions of Nigeria. Two main seasons characterize the zone: namely: rainy and dry seasons. The people of the South East zone of Nigeria are remarkable known crop farming,

livestock production, fishery and commercial and trading activities (Anejionu, Nwilo and Ebinne, 2013). Mixed cropping, mono-cropping, mixed farming and homestead farming are among the prevalent farming system in the zone.

South-East zone, Nigeria is deemed appropriate for this study because of its antecedent as a major cashew producing zone with four out of the five States of the zone being among the major cashew producing States in Nigeria (USAID-Nigeria, 2002; Lawal *et al*., 2011). Historically, cashew was first introduced into the zone by the Portuguese merchants as a means of checkmating erosion. Since then, emphasis has shifted from the use of cashew as a crop for erosion control to economic plant with high potential for livelihood and income generation.

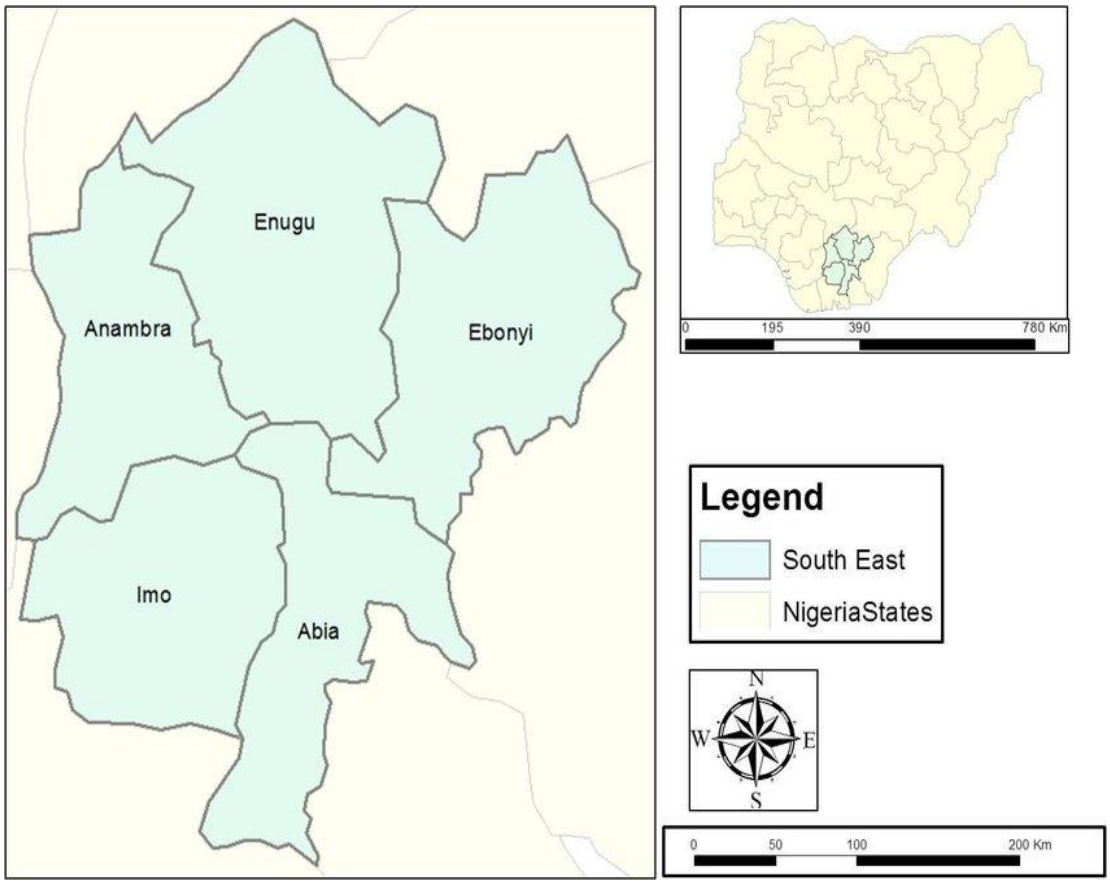

Figure 3.1: Map of South-East zone, Nigeria

Source: Anejionu *et al*. (2013)

3.3 Study population

The population of this study consists of the entire individuals involved in cashew processing in the South-East zone, Nigeria. Specifically, the population was drawn from the list of cashew processors obtained from the Agricultural Development Programme (ADP) of the sampled States who are mainly small scale, cashew processors. This is in line with the report of SBM Intelligence (2016), which stated that large cashew processing companies in Nigeria are located in Kwara, Kaduna, Ogun and Lagos. Based on their record, the State-by-State population of cashew processors indicates the following: Abia State – 13,221, Anambra State – 8,261, Enugu State – 23,820 and Imo State – 15,735. Thus, the total population of cashew processors in the study area is 61,037.

3.4 Sample size determination

In determining the sample size, the researcher made effort to ensure adequate representation of the whole population. In this regard, the proportional sample size formula developed by Krejcie and Morgan (1970) in Nwobashi and Itumo (2017) was adopted. Given that the sample frame is known, the construct is most appropriate for this study because it considered important parameters for sample size determination such as specific margin of error, and the desired confidence interval. The formula as developed by Krejcie and Morgan is stated thus:

$$n = \frac{X^2 x N x P\ (1-P)}{ME^2 x\ (N-1)) - (X^2 x P x\ (1-P))} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ 3.1$$

Where:

n = Sample size

X^2 = Chi-square for the specified confidence level at 1 degree of freedom

N = Population size

P = Population proportion

ME = Desired Margin of Error (expressed as a proportion)

Substituting into the formula, we have

X^2 = 3.84

N = 61,037

P = 0.5

ME = 5.2%

$$n = \frac{3.84\ x\ 61{,}037\ x\ 0.5\ (1-0.5)}{(5.2\%^{2*}(61{,}037-1)+\ (3.84\ x\ 0.5\ (1-0.5))}$$

$$n = \frac{58{,}595.52}{165.961344}$$

n ≈ 353

The error margin of ± 5.2% was chosen to ensure adequate representation of every member of the population through a large sample size. This is because error margin is inversely related to sample size (Research Advisors, 2006), that is to say, that choosing a larger error margin (10% and above) would result in a smaller sample size. Therefore, the 5.2% error margin at a 95% confidence interval was considered adequate for predicting the proportion of the population that generated the data for drawing valid conclusions for this study. Accordingly, the sample size of the study was determined as 353.

3.5 Sampling technique

This study adopted multistage random and purposive sampling techniques. In the first stage, four of the major cashew-producing States in South East, Nigeria

were purposively selected. This is based on the assumption that the availability of the raw material (cashew) will stimulate an individual's interest to engage in value addition activities in the area. Based on this, Abia, Anambra, Enugu, and Imo States were chosen. This also conforms to USAID-Nigeria (2002) and MORGAN (2016) categorization of major cashew producing States in Nigeria. From the four States, one agricultural zone each was purposively selected to give a total of four (4) agricultural zones. This was based on the result of a reconnaissance survey that was conducted to identify the major cashew producing zones in each of the States as well as the concentration of cashew processors in the area. The third stage involved the random sampling of three hundred and fifty-three (353) cashew processors from the lists of processors that were obtained from ADP in the sampled States (Table 3.1).

The selection of the respondents was proportionately done using Bowley's proportionate allocation technique (equation 3.2). This technique enabled us to determine the appropriate share of the sample size by each State, and the number of questionnaires to be allocated to each of the sampled States relative to their population. Bowley's proportionate allocation technique as quoted in Krishnaswamy *et al*. (2006) and Onwubiko *et al*. (2013) is expressed as follows:

$$nh = \frac{nNh}{N} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 3.2$$

Where:

nh = Number of questionnaires allocated to each State

Nh = Population size of each State

n = Total sample size obtained (353)

N = Total population (61,037)

Table 3.1: Distribution of population and sampled respondents

State	Sample frame of processors	No. of sampled respondents
Abia	13,221	76
Anambra	8,261	48
Enugu	23,820	138
Imo	15,735	91
Total	**61,037**	**353**

Source: Researcher's compilation of ADP record in the sampled States.

3.6 Source of data and instrument of data collection

The data for this study were sourced principally from a primary source. The data were obtained through the use of a structured questionnaire (Appendix I) that was administered to the sampled respondents through person-to-person contact. The questionnaire was designed to elicit information related to the objectives of the study. The instrument was designed to capture questions that were meant to provide answers to the research questions of this study. The questionnaire was divided into sections to reflect the objectives of the study.

To facilitate effective distribution and retrieval of the questionnaire, four research assistants who are University graduates were selected and trained to ensure adequate coverage and effective collection of the needed information from the respondents. The criteria for selection and training of the research assistants were based on their knowledge of research activity.

3.7 Data analysis

The survey data were analysed using the appropriate econometric tools. Specifically, objective (i) was achieved using inferential statistics of multinomial logistic (MNL) regression analysis. Objective (ii) was actualized using probit regression analysis while objective (iii) was analysed using ratio statistics, benefit-cost ratio, gross margin and rate of return to investment. Stata (version 13.1, StataCorp, Texas 77845, USA), SPSS version 20.0 and Microsoft Excel were used the enabling statistical software for analyzing the data.

Table 3.2: Summary of methodology

Objective	Methodology	Variables
Determine the factors that influence value addition to cashew products processed in South-East, Nigeria.	Multinomial logistic (MNL) regression	**Independent Variables**: Factors influence value addition – age, membership of cooperative society, type of market, educational attainment, cashew processing experience, monthly income, access to credit, access to cashew market, cashew physiognomies, perception about govt. policy on cashew processing, perceive cost of processing technology, market facilities, and business strategic goals. **Dependent variables**: Components of cashew receiving value addition – cashew kernel, nut and both cashew products.
assess the effect of value addition strategies on the competitive advantage of cashew products processed in the South-East zone, Nigeria.	Probit regression	**Independent Variable** – value addition strategies employed by cashew processors – quality improvement strategy, organizational growth strategy, packaging strategy, and sales strategy. **Dependent variables** – competitive advantage (yes or no).
Determine the income differentials, cost-benefit analysis, rate of turn to capital, and net income of cashew products processed in the South-East zone, Nigeria	Cost-benefit analysis – gross margin, benefit-cost ratio, rate of return and ratio statistics.	Total fixed cost, total variable cost, return to investment (profit) and net value-added cashew products.

3.8 Model specification according to objectives

3.8.1 Multinomial logistic (MNL) regression model

The factors driving value addition to cashew products processed in the South-East zone, Nigeria (objective i) was actualised with the help of multinomial logistic regression. Multinomial logistic (MNL) regression is a model that is useful for predicting the probabilities of diverse possible outcomes from a categorically distributed dependent variable, given a set of predictor variables (Greene, 2012). The predictor variables could be dichotomous/or binary, e.g. continuous (i.e., interval or ratio in scale) or polytomous (involving more than two categories of the response or outcome variable. MNL regression is often regarded as very attractive because it does not assume normality, homoscedasticity, and linearity (Starkweather and Moske, 2011). MNL model is very useful for explaining discrete choices (van Dijk *et al.*, 2007). Berry (1994) averred that an interesting feature of the MNL model is that the choice probabilities increase easily as the number of options increases. This feature makes the MNL model very applicable to discrete choice settings.

It is important to note that utility and choice are mainly deterministic from the cashew processor's standpoint. This study assumes that the factors influencing value addition to cashew are in random form, because some of the determinants of the utility are unobserved, which suggests that the choice can only be determined in terms of probabilities. For every rational processor, his choice for a particular cashew product to add value must be such that the utility derived ought to be significantly greater than the utility derived from the reference or base category (Greene, 2000).

For a clear illustration of the multinomial logistic model, let '*y*' be designed as a random variable that takes the values {1,2….j} for choices j, a positive integer, while '*x'* represents a set of conditioning variables. In this regard, '*y*' denotes the choice of value addition to cashew product in the South-East zone of Nigeria. Supposing every cashew processor has to choose from among a set of discrete, mutually exclusive choices of cashew products to add value (this implies that an individual precisely opts for one option out of many options, not more than or less than one). These measures appear to depend on factors of '*x*'. As a result, '*x*' denotes a set of independent variables influencing value addition to cashew products. However, it is important to ask how, if all things are equal, variations in the component of '*x'* can influence the response probabilities p(y=j/x), *j* = 1, 2…. k. The likelihood that a processor '*i*' will choose to add value to alternative product '*j*' among the set of cashew products is expressed mathematically as:

$$P\,(y=j/x) = P\,(U_{ij} > U_{ik}/x) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 3.3$$

Where: U_{ij} and U_{ik} are the perceived utilities by processor '*i*' of choice of product value addition to alternatives '*j*' and '*k*' correspondingly to X_1 being the vector of explanatory variables.

To elicit information on specific value addition activities on cashew, the processors were provided with a list of various cashew products that are produced from specific cashew part(s). The processors were asked to indicate the specific cashew part(s) that they add value to produce another form(s) of cashew product(s). From the responses of the cashew processors, the researcher was able to delineate two specific cashew parts that processors are adding value to, namely:

cashew nut, and kernel. It was observed that the processors were not adding value to cashew apple and such it was eliminated from the model, however, those adding value simultaneously to cashew nut, and kernel form the third category of the response variable.

(i) Cashew nut: This category of processors capture those who are engaged in various value addition activities on raw cashew nut that yields products such as cashew nut testa, cashew nut oil cake, cashew cheese, cashew kernel, cashew butter, and cashew nutshell liquid (CNSL).

(ii) Cashew kernel: The options listed in this category include processors whose value addition activities centered on cashew kernel to produce products like animal feed, lubricant, roasted cashew kernel, among others.

(iii) Both cashew products: This category comprises processors who engage simultaneously in adding value to cashew nut and kernel to yield products listed in (i) and (ii) above.

The MNL model is stated below as follows:

The MNL model has response likelihoods:

$$Pr(Y_i = j) = \frac{\exp(\beta_j X_i)}{1 + \sum_{j=1}^{k} \exp(\beta_j X_i)} \quad j = 1, 2, 3 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \; 3.4$$

Where: $\beta_j = K - 1, j = 1, 2, 3$

For the reference category,

$$Pr(Y_i = 0) = \frac{1}{1 + \sum_{j=1}^{k} \exp(\beta_j X_i)} \quad j = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \; 3.5$$

Where:

P ($Y_{i=j}$) denotes the probability of cashew processor to add value to any cashew products between 1, 2, 3. Pr ($Y_i = _o$) is the probability of being in the reference category.

The explicit function is stated as follows:

$$Y_i = In(P_j/P_o) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + ... + \beta_{13}X_{13} + ei \ldots\ldots\ldots 3.6$$

Y_i= Probability to add value to cashew products (i = 1, 2, 3)

Where: 1 = Cashew nut, 2 = Cashew kernel, 3 = Both cashew products; while the reference (base) category was chosen from the response variable with the highest frequency, which in this case is the cashew nut.

Table 3.3: Description of predictor variables and a priori expectation

Variable code	Description of variable	Method of measurement	Expected sign
X_1	Age of the processor	The age of the processors will be measured in years	-
X_2	Membership of cooperative society	Dummy (1 = yes, 0 = no)	+
X_3	Educational attainment of the processor	Number of years spent schooling	+
X_4	Monthly income generated from cashew processing	Amount in naira	+
X_5	Cashew processing experience	Years	+
X_6	Access to credit for cashew processing	Dummy (1 = yes, 0 = no)	+
X_7	Type of markets cashew products are marketed	Dummy (1 = village, 2 = urban, 3 = regional, 4 = international, 5 = e-market)	+
X_8	Cashew physiognomies	Dummy (1 = perishability; 2 = peelability; 3 = breakability; 4 = size; 5 = colour; 6 = aroma)	-
X_9	Perception of processors	Dummy (1 = favourable, 2 = fairly	+ or -

	about government policy on cashew processing	favourable, 3 = unfavourable)	
X_{10}	Perception of processor about cost of processing technology	Dummy (1 = very expensive, 2 = expensive, 3 = fairly expensive, 4 = not expensive)	+ or -
X_{11}	Market facilities for marketing of value added cashew products	Dummy (1 = accessible road 2 = modern storage facilities, 3 = communication facilities, 4 = stable electricity, 5 = portable water; 6 = processing equipment)	+
X_{12}	Business strategic goals of the processor	Dummy (1 = profit motive; 2 = product differentiation & branding; 3 = increase share of market sales; 4 = innovating new processing technique; 5 = quality improvement investment)	+
X_{13}	Distance from processing site to the nearest market	Kilometre	+ or -

β_{01} = intercept

$\beta_1 - \beta_{13}$ = coefficients of estimates

ei = stochastic error term

3.8.1.1 Relative Risk Ratio (RRR)

To determine the relative risk ratio (RRR) from the multinomial logistic model, having estimated a set of coefficients –$\beta^{(1)}$, and $\beta^{(2)}$, corresponding to each outcome as follows:

$$Pr(y = 1) = \frac{e^{X\beta^{(1)}}}{e^{X\beta^{(1)}} + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots 3.7$$

$$Pr(y = 2) = \frac{e^{X\beta^{(2)}}}{e^{X\beta^{(1)}} + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots 3.8$$

$$Pr(y = 3) = \frac{e^{X\beta^{(3)}}}{e^{X\beta^{(1)}} + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots \quad 3.9$$

The model, nonetheless, is unknown because there are several solutions to $\beta^{(1)}$, $\beta^{(2)}$and $\beta^{(3)}$ which will yield similar probabilities for y = 1, y = 2, and y = 3. To identify the model, it is important to arbitrarily set one of $\beta^{(1)}$ or $\beta^{(2)}$to 0 – it is unimportant which comes first. In other words, if $\beta^{(1)}$ is arbitrarily set to'0', the residual coefficient $\beta^{(2)}$ will estimate the variance relative to the y = 1 category. If on the other hand, $\beta^{(2)}$ is set to'0', the residual coefficient $\beta^{(1)}$ will estimate the variance relative to the y = category 2, and the same is applicable when $\beta^{(3)}$ is set to'0'. The coefficients would be the same and will have varied explanations, however, the forecasted probabilities for y = 1, 2, and 3 will remain unchanged (Greene, 2012; Hosmer, Lemeshow and Sturdivant, 2013). Therefore, whichever parameter is arbitrarily set; the solution will still be the same as the stated model below.

Setting $\beta^{(1)} = 0$, the equations become:

$$Pr(y = 1) = \frac{1}{1 + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots \quad 3.10$$

$$Pr(y = 2) = \frac{e^{X\beta^{(2)}}}{1 + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots \quad 3.11$$

$$Pr(y = 3) = \frac{e^{X\beta^{(3)}}}{1 + e^{X\beta^{(2)}} + e^{X\beta^{(3)}}} \quad \ldots\ldots\ldots\ldots \quad 3.12$$

The relative probability of y = 2 to the base outcome is

$$\frac{Pr(y = 2)}{Pr(y = 1)} = e^{X\beta^{(2)}} \quad \ldots\ldots\ldots\ldots \quad 3.13$$

This ratio is the relative risk, and further assume that X and $\beta_{13}^{(2)}$ are vectors equal to (X_1; X_2; : : : ; X_{13}) and $\left(\beta_1^{(2)}, \beta_2^{(2)} \ldots\ldots \beta_{13}^{(2)}\right)$, respectively. The ratio of the relative risk for a one-unit change in X_i becomes:

$$\frac{e^{\beta_1^{(2)}X_1+\cdots+\beta_1^{(2)}(X_1+1)+\beta_2^{(2)}(X_2+1)+\cdots+\beta_{13}^{(2)}X_{13}}}{e^{\beta_1^{(2)}X_1+\cdots+\beta_1^{(2)}X_1+\beta_2^{(2)}X_2+\cdots+\beta_{13}^{(2)}X_{13}}} = e^{\beta_i^{(2)}} \quad \ldots\ldots\ldots\ldots\ldots \textit{3.14}$$

Thus, the exponentiated coefficient measures the RRR for a unit change in the corresponding variable (this is estimated as the risk of an outcome on the comparison group as against falling on the base outcome). The coefficient of RRR enable us to measure the probability that a processor will choose to add value to comparison category (in this case cashew kernel as well as both cashew products) as oppose to the probability of choosing to add value to the base category (cashew nut) as the variable in question varies. The imperative of this analysis is predicated on the fact that the predictor variables are not static but vary. RRR enabled us to predict the component of cashew parts that a processor is likely to prefer adding value to when any of the predictor variables increase or decrease.

An RRR > 1 signifies that the risk of the outcome being in the comparison category with referent to the risk of the outcome being in the base category increases as the variable increases. In other words, there is a higher likelihood that the comparison choice will be chosen. An RRR < 1 shows that the risk of the outcome being in the comparison category with referent to the risk of the outcome being in the base category decreases as the variable increases. In other words, the higher chance that the outcome will be in the base category.

3.8.2 Probit regression model

A probit regression model was employed to determine the effects of value addition strategies employed by cashew processors in the South-East zone, Nigeria to achieve competitive advantage. The use of a probit model is predicated on the fact that the response variable – competitive advantage is discrete and binary/dichotomous (yes or no). The four categories of value addition strategies – quality improvement strategy, organizational growth strategy, packaging strategy and sales strategy employed by cashew processors were regressed to determine its effects on competitive advantage. Thus competitive advantage was subjectively determined by asking the respondents to state which of the outlined value addition strategies have effects on the competitive advantage of cashew products.

Competitive advantage was operationalized as the ability of processor to utilize the value addition strategies to create cashew products that meet or exceed customer's satisfaction more than his/her competitors. This was assessed based on their application of each subset of the four categories of value addition strategies rated on a 2-point scale of Yes = 1 if it achieves competitive advantage and No = 0 if otherwise. Using an interval of 0.05 as the decision rule, a mean value ≤ 0.49 was considered as not achieving competitive advantage; ≥ 0.05 was accepted as achieving competitive advantage. The choice of probit model for this analysis is because it assumes standard normal distribution function $\Phi(\cdot)$. Mathematically, the model assumes that:

$$E(Y|X)=P(Y=1|X)=\Phi(\beta_0+\beta_1 X) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 3.15$$

$\beta_0+\beta_1 X$ represents quantile z.

Recall that $\Phi(z) = P(Z \leq z)$, $Z \sim N(0,1)$ such that the Probit coefficient β_1 in equation 3.15 represents variation in '*z*' in relation to changes in '*X*' variable. Whereas the effect on '*z*' of a change in '*X*' is linear, the association between '*z*' and the outcome variable '*Y*' is nonlinear since '*Φ*' is a nonlinear function of '*X*'. With 'Y' being a binary variable, the model is stated as:

$$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+u \quad \ldots\ldots\ldots\ldots 3.16$$

Equation 3.15 is used to transform the expectation of the binary response variable (yes = 1, no = 0). The probit regress is modified as:

$$P(Y=1|X_1, X_2, X_3, X_4) = \Phi(\beta_0+ \beta_1X_1 + \beta_2X_2 + \beta_3X_3+ \beta_4X_4) \quad .... 3.17$$

The above is a population Probit model with predictor variables, X_1, X_2, X_3, X_4 and $\Phi(\cdot)$ is the cumulative standard normal distribution function.

The predicted probability that Y=1 or 0, given the independent variables, X_1, X_2, X_3, X_4 can be estimated as:

$$z = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 \quad \ldots\ldots\ldots\ldots 3.18$$

β_j is the effect on 'z' for a unit change in the independent variable 'X_j', given that other variables are held constant$(k-1)$.

Y = The probability that the value addition strategies employed by the cashew processors will achieve competitive advantage (Yes = 1; No = 0);

Table 3.4: Description of predictor variables

Variable code	Description of variable	Method of measurement	Expected sign
X_1	Quality Improvement Strategy	Dummy (Hygienic practice = 1, meeting international standardization and grading benchmark = 2, prolong shelf-life = 3, operational licence = 4, meeting minimum health & nutritional safety of HACCP = 5);	+
X_2	Organizational Growth Strategy	Dummy (Joint group venture = 1, partnership business = 2, entrepreneurship training = 3)	+
X_3	Packaging Strategy	Dummy (Colourful/attractive packs = 1, moisture/tamper proof packs = 2, durable packs = 3, vacuum sealed packs = 4	+
X_4	Sales strategy	Dummy (Advertising = 1, trade fair and exhibition = 2, sales promotion = 3, door-to-door sales = 4, e-marketing = 5, event sponsorship = 6, and point of purchase display = 7.	+

β_0 = intercept

$\beta_1 - \beta_4$ = regression coefficients

U = stochastic error term

3.8.3 Diagnostic tests of regression models

Table 3.5: Diagnostic tests of regression variables

Problem	Existing methods	Method chosen	Reason for the method chosen
Multicollinearity – correlation among predictor variables.	Eigensystem Analysis of X X′; Variance Inflation Factor (VIF); The use of F-statistic and individual t-statistics; and Examination of Correlation Matrix.	Variance Inflation Factor (VIF)	Besides indicating the correlation between the predictor variables, the square root of *VIF* indicates the extent of standard error.
Autocorrelation – error terms are positively correlated.	Durbin Watson; Ljung-Box; and Breusch-Godfrey test.	Durbin Watson	It is able to detect autocorrelation in the residual values of the regression.
Heteroscedasticity – variance errors depend on the values of the predictor variables.	Breusch-Pagan; White test; test park; Glejser test; and visual inspection of scatterplot graph	Breusch-Pagan	It is able to detect any linear form of heteroscedasticity in a regression model.

3.8.3.1 Results of diagnostic checks on MNL regression

The multinomial logistic (MNL) model that employed to determine factors driving value addition to cashew products processed in the South-East zone of Nigeria was first subjected to preliminary checks to ensure adherence to the regression assumptions, in addition to enhancing the accuracy of the result. To achieve these, the following assumptions' tests were carried out:

heteroscedasticity, autocorrelation, and multicollinearity tests and the results are presented below:

Table 3.6: Variance inflation factor (VIF)

Variable	VIF	1/VIF
Household size	2.21	0.45
Product characteristics	1.83	0.55
Perception about Processing technology	1.78	0.56
Access to market	1.34	0.75
Processing technology	1.29	0.78
Monthly income	1.26	0.79
Age	1.25	0.80
Education level	1.23	0.82
Membership of cooperative	1.10	0.91
Access to credit	1.08	0.93
Distance to market	1.05	0.96
Market facilities	1.03	0.97
Perception about govt. policy on cashew processing	1.03	0.97
Business strategic goal	1.02	0.98
Mean VIF	1.32	

Source: This study (2020)

The test of heteroscedasticity in the model as provided by the Breusch-Pagan test shows the p-value was .8807, which exceeds 0.05 probability level (Table 3.6). Therefore, it is concluded that the alternative hypothesis is rejected and the null hypothesis accepted that the variance of the residuals is homogenous in the model. This confirms that the assumption of homoscedasticity was met. The autocorrelation test as given by the Durbin-Watson statistic was 2.4. The acceptable value of the Durbin Watson Statistic is 2 but it permits a range of ± 2.

This implies that the model is free of autocorrelation as such the assumption was not violated. The multicollinearity statistics as provided by the variance inflation factor (VIF) scores range from 1.02 – 2.21, which are far below 10 and the tolerance values (0.45 – 0.98), defined by 1/VIF are well above 0.2 (Table 4.2). This suggests the absence of multicollinearity in the model as such the assumption was met.

3.8.3.2 Results of diagnostic checks on probit regression

The probit model was subjected to diagnostic checks to ascertain its reliability and conformity to binary regression assumptions. The checks carried out were: multicollinearity, autocorrelation, heteroscedasticity, and good fit of the model. The multicollinearity test from the scores of Variance Inflation Factor (VIF) was observed to range from 2.96 – 6.58 (Table 3.7), which are well below 10.0 and the tolerance statistics are far above 0.2. This attests to the absence of multicollinearity in the model, thus, the assumption that the predictor variables are uncorrelated with one another was met.

Table 3.7: VIF result of effects of value addition strategies on the competitive advantage of cashew products processed in South-East zone, Nigeria

Variable	VIF	1/VIF
Packaging strategy	6.58	0.252022
Organizational growth	4.04	0.247421
Quality improvement	3.03	0.330143
Sales strategy	2.96	0.337588
Mean VIF	4.15	

Source: This study (2020)

The heteroscedasticity check as provided by the Breusch-Pagan test gave rise to a chi-square value of 2.03, and a P-value of 0.1537, which is greater than 0.05. Accordingly, the alternative hypothesis was rejected and the null hypothesis accepted that the variance of the residuals is homogenous in the model and thus, the assumption of homoscedasticity was met. The check for autocorrelation as provided by the Durbin Watson statistics was 1.82. This value is within the acceptable range of ±2, thus, confirming the absence of autocorrelation in the model. To check the probit model fit, the Pearson chi-square value (103.31) and p-value (0.000) were taken into consideration. The significance of the p-value ($p<0.05$) attests to the good fit of the model.

3.8.4 Cost-benefit analysis

To achieve the cost-benefit analysis due to value-added to cashew products, the cashew processors were delineated into three categories as follows:

Category 1..... Those adding value to cashew nut

Category 2..... Those adding value to cashew kernel

Category 3..... Those adding value to both cashew products

Gross margin (GM) was applied to determine the discrepancy between the total revenue (TR) and total variable cost (TVC) of cashew processing (Salau *et al*., 2017). This was employed to evaluate the costs, revenues and the net profit of value-added cashew products in the area.

$$GM = TR\text{-}TVC \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 3.19$$

Where: GM = Gross margin, TR = Total revenue, TVC = Total variable cost.

The net return represents the total profit which will be calculated by using the following formula:

Net return = TR – TC,

Where: TR = Total revenue, TC = Total cost, and

$$\textit{Rate of return to investment (ROR)} = \left(\frac{TR - TC}{TC}\right) x\ 100 \ldots\ldots\ldots\ldots 3.20$$

3.8.4.1 Determination of the benefit-cost ratio

The benefit-cost ratio is the ratio of the amount received from sales over the costs for every one naira invested in adding value to cashew products. According to Noonari *et al*. (2016), BCR is calculated as:

$$BCR = TR/TC \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.21$$

Where:

BCR = Cost-benefit ratio

GR = Total revenue

TC = Total cost

3.8.4.2 Determination of net income of value-added cashew products

To determine the net income as a result of value addition to cashew products, the fixed cost (that is cost of equipment and machineries) was determined by subtracting total costs (fixed and variable costs) from Total revenue (Hoq, Raha and Sultana, 2012). Net income due to value addition is:

$$NIVA = GM - TFC \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.22$$

Where:

NIVA = Net income from value addition

GM = Gross margin

TFC = Total fixed cost

3.8.4.3 Ratio Statistics

Ratio statistics offers a thorough overview for the description of the ratio between two scale variables. In other words, it describes the variability between two scale variables. It is applied in this study to determine the ratio of variability between revenue and cost among categories of processors adding value to cashew products in the South-East zone of Nigeria.

Ratio *(Ri)* = $\frac{A_i}{S_i}$, = i = 1,…,n

Where:

n = Number of observations

Ai = Numerator of the *I*-th ratio (*i* = 1.., *n*). This represents the revenue (₦).

Si = Denominator of the *i*-th ratio (*i* = 1,…, *n*). This represents the cost (₦).

Ri = The *i*-th ratio (*i* = 1, …, *n*).

fi = Case weight associated with the *i*-th ratio (*i* = 1, …, *n*).

3.8.4.4 Coefficient of Dispersion (COD)

COD measures the variability in the ratios. A larger COD value indicates a greater variability.

COD = 100% x $\frac{AAD}{R}$

Where:

COD = coefficient of dispersion; AAD = average absolute deviation; R = ratio

3.8.4.5 Average Absolute Deviation (AAD)

AAD = $\sum_{i=1}^{n} f_i |\text{Ri} - \hat{\text{R}}| / \sum_{i=1}^{n} f_i$

3.8.4.6 Coefficient of Concentration (COC)

COC is a report of the percentage of values within a certain percentage of the median. Variable with the highest COC suggests no variability while the group with the least COC value indicates there is variability between the variables. Given a percentage of 100% x g, the COC is the percentage of ratios being within the interval $[(1 - g)\hat{R}, (1 + g)\hat{R}]$. Note: higher coefficient indicates better uniformity.

3.8.5 Test of Hypotheses

Table 3.8: Hypotheses Testing

S/N	Null Hypotheses	Statistics for testing hypothesis	Decision rule at 0.05
1	There are no factors influencing value addition to cashew products processed in the South-East zone, Nigeria.	Chi-square from the Likelihood Ratio Statistics	Accept null hypothesis if the p-value is higher than 0.05 otherwise reject
2	Value addition strategies have no significant effect on the competitive advantage of cashew products processed in the South-East zone, Nigeria.	Chi-square from the Likelihood Ratio Statistics	Accept null hypothesis if the p-value is higher than 0.05 otherwise reject
3	There are no income differentials across cashew processors adding value to cashew products in the South-East zone, Nigeria	ANOVA	Accept null hypothesis if the p-value is higher than 0.05 otherwise reject

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter deals with the presentation of the results gotten from the analysis of data obtained. The analysis was conducted to reflect the parts of cashew to which the processors are adding value (i.e. cashew products such as cashew nut, kernel, and both cashew products). The results were presented in line with the research objectives. From the analysis, it was observed that three (3) categories of processors engaged in value addition to cashew products. These are those adding value to raw nut, kernel and both cashew products. Meanwhile, 49.0 percent of the processors are into cashew nut value addition, 39.4 percent add value to cashew kernel, and 11.6 percent of them add value to both cashew products.

4.2 Socioeconomic attributes of the cashew processors

The socioeconomic attributes of the cashew processors examined here include: sex, age, marital status, education attainment, household size, access to credit, processing experience, monthly income from cashew processing, cashew physiognomies, type of market, cooperative membership, distance to market, market facilities and business strategic goals. So far the result shows that none of the processors had access to training programme, so it was not presented in Table 4.1.

4.2.1 Sex of the cashew processors

The sex composition of the sampled processors as presented in Table 4.1 indicates that females almost dominated the entire population of cashew processors in the area. The breakdown shows that 49.0 percent of those adding value to

cashew nut were females while 37.1, and 10.2 percent of processors adding value to cashew kernel, and both cashew products were females, and few (2.3, and 1.4 percent) males add values to cashew kernel, and both cashew products respectively. Traditionally, the processing of agricultural produce is considered as an exclusive task of women in Nigeria. This phenomenon accounted for the dominance of female processors in cashew value addition in the South-East zone of Nigeria. The finding coincides with that of Kehinde and Aboaba (2016) who found that over 90 percent of processors adding value to cassava in Southwest, Nigeria were females. Similarly, Adeigbe *et al*. (2015) reported that a large proportion of Nigerian women are engaged in cashew value-chain activities. Given credence to the above assertion, Akinwale (2000); Topper *et al*. (2001) averred that cashew production and processing activities provide employment and livelihood for smallholder farmers especially women in Nigeria. Srivatsava (2016) supported the above assertion by opining that women constitute over eighty percent of the workforce involve in raw cashew collection and value addition.

Furthermore, Ekong (2003) shared a similar view by asserting that women accounted for 100% of basic food commodities processors as well as up to 50 and 90% of agro-marketers. Banji and Okunade (2011) reported that about 92% and 79% of women in Oyo State, Nigeria are involved in the processing as well as marketing of agricultural produce respectively. Similarly, Aneke and Alio (2018) found that over 70% and 80% of women in Enugu State are involved in processing and marketing of agricultural produce. Thus, cashew value addition activity in the South-East zone of Nigeria is predominantly carried out by females.

4.2.2 Age of the cashew processors

The age of the cashew processors shows that those adding value to cashew nut have a slightly higher mean age of 41.6 years, followed by those adding value to both cashew products with an average age of 39.8 years, and 32.7 years for processors adding value to cashew kernel (Table 4.1). This result shows that the processors are middle-aged people who are within their active productive age, but apparently, the cashew nut processors are slightly older than those adding value to other cashew products. This may not be unconnected with the activities involved in adding value to each of the cashew products – nut and kernel.

Typically, the raw cashew nut is manually processed through a tedious process that involves roasting the nut on a metallic pan under a burning fire that generates heavy heat. This tedious processing technique could be a reason why younger people are not interested in the venture. The sourcing of raw cashew nuts is equally drudgery. Many of the cashew nut processors outsource the product from cashew farmers and/or from itinerary gatherers while some of them scavenge the forest for the product. These activities are considered drudgery and tedious, thus, discourage younger people from getting involved. Processors of cashew kernel buy the intermediate product – roasted nut from the cashew nut processors. They equally employ certain mechanical procedures like oven baking and outsource certain tasks to hired labourers to reduce drudgery and enhance efficiency in cashew kernel processing. This makes it more attractive to younger people when compared to raw nut processing.

Table 4.1: Socio-economic distribution of cashew processors

Variable	Cashew nut processors (n = 173)	Cashew kernel processors (n=139)	Both cashew product (n=41)	Sig.
Sex (%)				*
Male	0.0	2.3	1.4	
Female	49.0	37.1	10.2	
Age (X)	41.6	32.7	39.8	*
Marital status (%)				*
Single	0.0	7.4	0.6	
Married	38.0	32.0	8.2	
Widowed	11.0	0.0	2.8	
Education level (%)				*
No formal education	10.8	0.0	2.8	
Primary school	24.9	15.3	4.0	
Secondary school	13.3	24.1	4.8	
Household size (X)	6	4	5	*
Access to credit (%)				*
Yes	0.0	13.9	4.0	
No	49.0	25.5	7.6	
No. of times (X)	0.0	3.0	0.0	
Monthly income (X)	20,959.5	37,223.0	45,414.6	*
Processing experience (X)	14.8	7.9	13.4	*
Type of markets (%)				
Village market	49.0	28.0	6.8	
Urban market	5.1	31.7	9.1	
Distance to market (X)	14.8	7.2	13.2	
Membership of coop. society (%)				*
Yes	0.0	31.7	4.8	
No	49.0	7.6	6.8	
Marketing facilities (%)				
Accessible road	43.9	39.4	9.9	
Communication facilities	49.0	39.4	11.6	
Electricity power	6.0	31.7	4.8	
Modern storage facility	0.0	0.0	0.0	
Business strategic goals (%)				
Profit maximization	49.0	39.4	11.6	
Increase sales volume	0.0	24.1	4.8	
Product differentiation & branding	0.0	12.7	8.5	
Innovate new processing technique	0.0	9.6	4.2	
Invest in quality improvement	0.0	13.5		
Perception about govt. policy (%)				
Favourable	0.0	0.0	0.0	
Fairly favourable	2.5	12.8	3.2	
Unfavourable	46.5	26.6	8.4	
Perception about cashew processing technology (%)				*
Very expensive	0.0	29.7	2.3	
Expensive	0.0	4.5	2.0	
Not expensive	49.0	7.4	7.4	
Product characteristics (%)				
Perishability	0.0	0.0	0.0	
Peeliability	12.7	19.0	4.5	
Size	5.1	19.8	4.2	
Colour	36.3	39.4	9.6	
Cashew nut shell liquid (CNSL)	7.1	0.0	2.0	

Source: This study (2020)

4.2.3 Marital status of cashew processors

The result indicates that cashew processing in the South-East zone of Nigeria was carried out mainly by married women with 38.0 percent adding value to cashew nut, followed by those adding value to cashew kernel (32.0 percent) while 8.2 percent of the married processors add value to both cashew products. This finding agrees with that of Omulo (2016) who reported that over 65 percent of married people are involved in adding value to traditional vegetables in Lugari, Kenya. More so, 11.0 percent of the respondents who add value to cashew nut were widowed while single or unmarried processors are more into cashew kernel processing (7.4 percent). The import of marriage cannot be overstated as it confers certain degree of responsibilities on people. Thus, the high proportion of married people in cashew value addition could be seen as part of their livelihood responsibilities to meet the needs of family members.

4.2.4 Educational qualification distribution of the cashew processors

The result equally shows that most (24.9 percent) of the educated cashew nut processors completed primary school education, 10.8 percent of them have no formal education while least (13.3 percent) have secondary school education as their highest educational qualification. Also, 24.1 percent of the cashew kernel processors completed secondary school education and the rest (15.3 percent) had primary education. More so, 4.8, and 4.0 percent of processors adding value to both cashew products had secondary and primary schools education respectively. The finding clearly shows that cashew kernel processors have higher educational level than their counterparts.

Apparently, the cashew processors had basic education and none of them had higher education. Although this level of education is sufficient to equip the processors with reading and writing skills, it is inadequate for grasping complex technical and managerial skills required for business development and growth such as writing a business plan, and feasibility study which is a prerequisite for accessing credit from formal credit institutions. Alluding to this assertion, Ngore (2010) averred that educational attainment has a direct positive correlation with managerial skills. It is however not surprising that none of the processors had tertiary education because highly-educated people are most likely to perceive cashew processing as a menial and drudgery job, fit only for the lowly educated and uneducated people (Mishra and Uematsu, 2010). They rather prefer to chase after white-collar jobs, which are nonexistent.

Education shapes people perceptions and dispositions towards entrepreneurial orientation. According to Sánchez (2010), education enables individuals to become aware of career choices, and broaden their faculties, thereby equipping them to perceive better business opportunities. Value addition being an entrepreneurial activity requires educational training for one to be successful.

4.2.5: Household size of cashew processors

The result equally shows that processors adding value to cashew nut with a mean of 6 persons have a slightly higher household size than those adding value to both cashew products (5 persons) and cashew kernel (4 persons). Obviously, the cashew processors have relatively small to medium-sized households. A similar finding has been credited to Omula (2016), who reported that female farmers adding value to traditional vegetables in Lugari, Kenya had an average of 5

household sizes. The processors of cashew nut having a higher household size could be considered advantageous in providing free household labour that can assist in reducing the manual drudgery activities associated with raw cashew nut processing. Moreover, having a large household size could inspire cashew processors to intensify cashew value addition activities so as to earn a higher return for their family upkeep.

4.2.6 Access to credit and number of times

The analysis equally shows that cashew nut processors have no access to credit while 13.9, and 4.0 percent of processors of cashew kernel, and both cashew products had access to credit. Meanwhile, the frequency of access to credit was 3 times. The finding obviously indicated that cashew processors have been excluded from the credit delivery system in the area. Even the very few cashew kernel processors that accessed credit did that at a very low frequency. This portends grave implications for the processors in that they are unable to scale up their enterprises beyond the micro-level.

In Nigeria, women face disproportionate hindrances to a credit facility with their men counterparts because of the patriarchal social system that disallows their inheritance rights. The lack of inheritance right means they don't own land and other resources that can be used as collateral to secure a loan from credit institutions. Ekong (2011) consented to the above by stating that many women agro-entrepreneurs are excluded from accessing credit from financial and government institutions because they don't own security assets such as land which qualify them for such facilities.

International Finance Corporation (IFC) (2016) observed that the inability of women entrepreneurs to access credit limits their ability to acquire production inputs, leverage appropriate technology, maintain sufficient operating capital, and compete favourably in the market arena. Ultimately, inadequate operating capital limits women cashew processors from being able to scale up their operational capacity. This may also impede women cashew farmers from adding extensive value to their produce; they will rather choose to sell intermediate cashew products.

4.2.7 Monthly income distribution of the cashew processors

The monthly income distribution of the processors indicates that cashew kernel processors and those adding value to both cashew products earned a far higher income than those adding value to cashew nut. Processors adding value to both cashew products earned a mean sum of ₦45,414.6 (US $126.2) while cashew kernel processors earned an average of ₦37,223.0 (US $103.4) as against ₦20,959.5 (US $58.2) earned by cashew nut processors. This result shows that value addition to cashew products remains a source of livelihood for the processors. This is in tandem with the view of Lu and Dudensing (2015) who asserted that value addition is critical for improving the livelihood opportunities of small-scale farmers, processors, and marketers. Similarly, Adeigbe *et al*. (2017) estimated that cashew activities provide a livelihood for over 300,000 households and sustains 600,000 jobs in the value chain activities as harvesters, transporters, processors, marketers, and exporters in Nigeria.

Coltrain *et al*. (2000) submitted that the dwindling number of employment opportunities in other sectors is propelling rural dwellers to engage in food

processing, enabling them to earn income. By adding value to agricultural produce, the food processing subsector contributes to rural economic development through income and wealth creation (Barkama and Drabenstott, 1996). Income being money received for sales of value-added cashew products is a critical component of investment return. This makes it one of the essential stimuli that influence processors to venture into cashew value addition.

4.2.8 Processing experience of the cashew processors

The processing experience shows that cashew nut processors with a mean of 14.8 years have slightly higher experience than those adding value to both cashew products (13.8 years), and cashew kernel processors (7.9 years). The result suggests that the cashew processors with these levels of experience ought to been acquainted with vital managerial and technical processing practices that present opportunities for improving value addition activities to cashew products. This is in tandem with Okebiorun and Jatto (2017) who averred that the length of time spent on agro-enterprise enhances managerial and technical efficiency of agribusiness entrepreneurs.

4.2.9 Type of markets

The type of markets available and accessible to cashew processors were assessed and the result indicates that 49.0 percent of cashew nut processors sell their product mainly at the village market while 5.1 percent sell at urban market. However, more of the cashew kernel processors (31.5 percent) trade their product at the urban market as against 28.0 percent that sell at village market. Processors adding value to both cashew products sell their products in urban (9.1 percent), and rural (6.8 percent) markets respectively. Obviously, the result suggests that

processors of cashew kernel have higher access to both urban and village markets as against their counterparts in cashew nut processing who are mainly confined to the village market. This has serious implications for the pricing system in the rural market as most of the cashew nut processors will be forced to sell their product at a giveaway price because of limited buyers and the absence of storage facility to store unsold products for future sale when prices maybe unfavourable. APMC (2019) concurs with this view by stating that access to urban and wholesale markets enables agricultural producers and traders to overcome market challenges such as underpricing, which cannot be obtained in rural and village markets.

4.2.10: Distance from processing site to marketplace

From the result, it was evident that cashew nut processors despite accessing more of the village market cover longer distance to the marketplace with a mean value of 14.8 km while processors adding value to both cashew products have a mean distance of 13.2 km, and cashew kernel processors cover a shorter distance of 7.2 km. Apparently, the fact that many of the cashew nut processors live in the rural area where the settlement pattern is highly scattered may have accounted for the longer distance. The implication is that cashew nut processors may have to spend twice of whatever the cashew kernel processors spend on transportation.

4.2.11: Membership of cooperative society

Furthermore, the result indicates that the entire (49.0 percent) cashew nut processors were not members of cooperative society whereas 31.7 and 4.8 percent of cashew kernel processors and those adding value to both cashew products respectively were members of processing cooperative society. The finding agrees with that of Kehinde and Aboaba (2016) who found that over seventy percent of

cottage level cassava processors in southwest, Nigeria were not members of cooperative society. The low cooperative membership of cashew processors poses a serious impediment to harnessing the advantages associated with cooperative group actions such as capital mobilization, and better bargaining power for the processors' benefits. Cooperative society provides a platform for pooling resources and social engagement among members. It provides a medium for mobilizing group action to benefit from governmental and non-governmental organizations' programmes such as credit assistance, trainings, among others.

The high proportion of the cashew kernel processors who are members of cooperative society may be due to the higher volume of value addition activities they carry out when compared to cashew nut processors who process the intermediate product, which is bought by the cashew kernel processors for further processing. Alluding to this, Nebraska Cooperative Development Center (2014) affirmed that the objective of adding value to agricultural commodities is to increase the profit margin while improving the attractiveness of the product to the consumers. Furthermore, Ntale, Litondo and Mphande (2014) asserted that farmer associations are very useful to agricultural value addition because it enables them to pool their resources together to achieve a greater profit level which would have been difficult to achieve at individual's farmer level.

The none involvement of cashew nut processors in cooperative society means that they are completely excluded from any governmental and non-governmental schemes for micro and small agro-enterprises development in Nigeria. They are unable to access and participate in many of the government and financial institutions' business development and credit advancement programmes.

4.2.12 Marketing facilities

The result of the marketing facilities available to cashew processors indicates that 43.9 percent of the cashew nut processors have accessible roads while 39.4 and 9.9 percent of the cashew kernel processors, and those adding value to both cashew products have accessible roads. Telecommunication facilities were the most available marketing facilities with 49.0, 39.4, and 11.6 percent possession among processors adding value to cashew nut, cashew kernel, and both cashew products respectively. However, for electricity power, cashew kernel processors have far greater access to electricity with 31.7 percent than cashew nut processors (6.0 percent), and those adding value to both cashew products (4.8 percent). From the above result, it is obvious that apart from telecommunication facilities, other market facilities such as modern storage facilities are grossly inadequate in the South-East zone, Nigeria. The absence of modern storage equipment, for instance, means that the processors are under pressure to sell their products whether prices are favourable or not since they lack the facilities to store unsold products.

Market facilities are essential for stimulating value addition to cashew products. Availability of adequate market facilities can influence cashew processors to add value to their products because it reduces marketing costs and guarantees a higher price margin. Given credence to this, World Bank (2007) observed that the absence of market infrastructures can significantly add to the marketing costs of market participants. Similarly, Patnaik (2011) observed that the absence of adequate market facilities impedes small-scale farmers from participating successfully in agricultural marketing. According to Ismail (2014), the availability of improved market infrastructures such as rural roads and modern

storage facilities are vital for the efficient marketing of agricultural commodities. Investment in market facilities is essential for stimulating agro-entrepreneurs participation in cashew value addition.

4.2.13 Business strategic goals of cashew processors

The business strategic goal of the cashew processors is basically profit maximization with 100 percent responses (49.0, 39.4, and 11.6 percent) among processors adding value to cashew nut, cashew kernel, and both cashew products. Meanwhile, cashew kernel processors and those adding value to both cashew products are equally pursuing other business strategic goals such as increase sales volume (28.9, and 4.8 percent), product differentiation & branding (15.6, and 8.5 percent), investing in quality improvement (13.5, and 2.3 percent), and innovating new processing technique (9.6, and 4.2 percent) respectively. Apparently, the result suggests that the core business strategic goal shared by both processors (cashew nut, and kernel) is profit maximisation. The finding corroborates that of Ngore, Mshenga, Owuor and Mutai (2011) that profit maximisation is the foremost reason given by butchers in Kenya for adding value to meat. Similar finding has been credited to Armagan and Ozden (2010) who observed that agro-entrepreneurs add value to dairy farm products in order to improve profit and maximize better market margins. More so, improving sales volume as a rationale for value addition has been reported by Ngore *et al*. (2011) among butchers in Kenya.

The product differentiation activities of the kernel processors include: packaging, sealing, corking, labelling and branding. The objective is to create cashew products with unique attributes that can attract the attention of customers to the distinctive features and benefits of their product to separate it from that of their

competitors. Product differentiation increases the probability of customers choosing their product over the undifferentiated one. By so doing, the cashew kernel processors strive to increase the acceptability and patronage of their product so as to edge out their competitors.

4.2.14 Perception of processors about government policy on cashew processing

The assessment of the cashew processors' perception about government policy on cashew processing shows that 46.5 percent and 2.5 percent of cashew nut processors perceived government policy as unfavourable, and fairly favourable respectively while 26.6 percent and 12.8 percent of cashew kernel processors perceived it as unfavourable, and fairly favourable respectively. However, more (8.4 percent) of those adding value to both cashew products considered the government as unfavourable. From this finding, it is apparently clear that the processors have an unfavourable perception of government policy on cashew processing. The reason adduced for this was that they have not received any forms of support from the government, be it in kind or cash.

The lack of government support constrained the processors' ability to build capacity for cashew value addition. Consequently, they are confined mostly to traditional and small-scale processing methods, which do not give room for the application of innovative value addition techniques to cashew processing. This may have accounted for the inability of the processors to expand value addition activities to products other than cashew nut, and roasted kernel. In the view of Madura (2006), bureaucratic bottlenecks especially in developing nations such as Nigeria encourage corrupt practices that inhibit effective policy implementation.

Consequently, government policies toward cashew processing can encourage or hinder cashew value addition.

4.2.15 Perception of cashew processors about cashew processing technology

The perception of the cashew processors about cashew processing technology varies based on the cashew product they add value. For instance, 49.0 percent of those adding value to cashew nut believed that cashew processing technology is not expensive. This may be due to poor awareness about modern cashew processing technology because of the continuous reliance of cashew nut processors on the traditional method of cashew nut processing. However, the cashew kernel processors shared different perceptions with 29.7 percent feeling that cashew processing technology is very expensive while 7.4 percent of processors adding value to cashew kernel, and both cashew products believe it is not expensive respectively. This perception may have been informed by the discourse in their cooperative meetings since many of them are members of cooperative society. This confirms the importance of a cooperative society as a platform for information dissemination among members.

Technology in this sense refers to a range of equipment that can be used to improve efficiency in cashew value addition. The processors' low use of modern technology means that it will take a longer time and much physical energy to convert cashew into various value-added products. This agrees with the view of International Finance Corporation (2016) that the lack of access to improved processing technology among women represents a time burden, which hinders them from engaging in other income-generating ventures.

4.2.16 Cashew product characteristics that influence value addition

The cashew product characteristics result shows that the product characteristics that influenced value addition to cashew nut are: size (40.5 percent), colour (36.3 percent), and peelability (12.7 percent). Meanwhile, the characteristics of cashew that influence cashew kernel processors are colour (39.4 percent), size of nut (36.3 percent), and peelability (19.0 percent). More so, colour (9.6 percent), size (6.2 percent), and peeliability (4.5 percent) influenced processors to add value to both cashew products. Evidently, achieving specific colour (white), size of nut and degree of peelability are the most common cashew characteristics that influence value addition varied processors of cashew.

Furthermore, 7.1, and 2.0 percent of the processors adding value to cashew nut and both cashew products respectively indicated an interest in considering cashew nut shell liquid (CNSL) content. CNSL is cashew oil located between the seed coat and the nut. CNSL is normally extracted prior to the shell is separated from the nut in an advanced industrial cashew processing system. Typically, the processors roast cashew nut in a metallic pan with the CNSL serving as fuel. This process leads to the loss of CNSL (FAO, 1992), which is a useful industrial material for brake lining compounds, waterproofing agents, a preservative, and in the manufacturing of paints and plastics. Thus, processing cashew in a manner that will preserve the CNSL will add more income to the processors.

4.3 Factors that influence value addition to cashew products processed in South-East zone of Nigeria

These factors were examined using MNL regression analysis (Table 4.2).

Table 4.2: Multinomial Logistic regression result of factors that influence value addition to cashew products processed in South-East zone of Nigeria

Variable name Cashew nut	Coefficient (base outcome)	Std. Error	Z	P>|z|
Cashew kernel				
Age	0.019	0.032	0.59	NS
Educational level	0.004	0.062	0.07	NS
Household size	-1.085	0.396	-2.74	***
Monthly income	0.001	0.0005	2.34	**
Processing Experience	0.009	0.052	0.18	NS
Access to credit	-0.694	0.821	-0.84	NS
Membership of cooperative	0.058	0.515	0.11	NS
Access to market	2.782	0.387	7.18	***
Distance to market	0.035	0.036	0.96	NS
Cashew physiognomies	0.743	0.164	4.54	***
Govt. policy on cashew proc.	0.911	0.752	1.21	NS
Perception about the cost of processing technology	-2.464	0.394	-6.26	***
Market facilities	0.383	0.415	0.92	NS
Business strategic goals	-0.060	0.175	-0.34	NS
Constant	5.309	4.182	1.27	NS
Both cashew products				
Age	0.043	0.030	1.42	NS
Educational level	0.002	0.059	0.04	NS
Household size	-0.593	0.370	-1.60	NS
Monthly income	0.0001	0.00006	2.24	**
Processing Experience	0.012	0.048	0.25	NS
Access to credit	-0.480	0.786	-0.61	NS
Membership of cooperative	-0.425	0.489	-0.87	NS
Type of markets	1.781	0.376	4.74	***
Distance to market	0.014	0.034	0.42	NS
Cashew physiognomies	-0.448	0.167	-2.69	***
Govt. policy on cashew proc.	1.826	0.915	2.00	**
Perception about the cost of processing technology	-1.510	0.394	-3.84	***
Market facilities	0.824	0.406	2.03	**
Business strategic goals	0.012	0.166	0.07	NS
Constant	-5.552	4.370	-1.27	NS
Number of obs = 353		LR chi2(28) = 379.61		
Pseudo R^2 = 0.5563		Prob > chi2 = 0.000		

Log likelihood = -151.391

Note: ***, and ** signify significant at 1%, and 5% levels
NS indicates not significant.
Source: This study (2020)

From the result of the multinomial logistic regression, the Pseudo R^2 was 0.56, which indicates that the basic change in the log-likelihood from the intercept-only model to the current model (Table 4.2). The high value of the pseudo R^2 equally confirms the good-fit of the model. The Likelihood Ratio (LR) Chi-Square of 379.61 with p-value = 0.0000 suggests that none of the independents' regression coefficients is equal to zero. In other words, the model fits significantly better with these predictor variables than as an empty model (i.e., a model without independent variables). The probability of adding value to cashew products is the response variable in this MNL regression. The analysis gave rise to two replicates of explanatory variables, which represent two models estimated for the probability of (i) adding value to cashew kernel relative to cashew nut, and (ii) both cashew products relative to cashew nut.

4.3.1.1 Household size:

The negative coefficients of household size in the two models imply that large household size decreases the likelihood of adding value to cashew kernel, and both cashew products relative to cashew nut by 108.5 and 59.3 percent respectively. The result confirms that processors with large family members are more likely to add value to cashew nut as against cashew kernel, and both cashew products. The finding contrasts that of Berem *et al*. (2010), who reported that the coefficient of household size is positively correlated with the degree of value addition. Similarly, Agwu *et al*. (2015) reported that large household size is

positively correlated with the likelihood of adding value to cassava products in Abia State, Nigeria. Meanwhile, household size was significant (P<0.05) in the first model but insignificant (P>0.05) in the second model, suggesting that household size significantly influence value addition to cashew kernel. This may be due to the higher labour requirement of processors adding value to cashew kernel.

Although, studies have reported that large family size is advantageous because it provides free labour to support activities in agricultural enterprises (Eze and Nwibo, 2014; Ezeh, and Eze, 2016), as plausible as this may sound, the need to acquire formal education has overridden this cliché. Children now spend most of their time in schools with even many of them living in a boarding facility. This makes these children unavailable to support family enterprises such as cashew processing. More so, some States' government in Nigeria have introduced a policy of free and compulsory education up to secondary school level for all school-age children. As part of this policy, the government set up a task force on loitering and truancy to apprehend school-age children hacking/or doing other things during school hours. This measure has further compelled many parents and guardians to send their children and wards to schools as against the practice of deploying them to serve as free family labour in their enterprise. Obviously, keeping a large family size may increase pressure on the cashew kernel processors by draining income from cashew kernel processing for the upkeep of family members.

4.3.1.2 Monthly income:

The coefficients of monthly income in both models were positive, which is an indication that the high-income generation has the likelihood of increasing

cashew processors decision to add value to cashew kernel, and both cashew products relative to cashew nut by 0.013 percent respectively. Monthly income also showed statistically significant ($P<0.05$) in the two models, signifying that it has a significant influence on value addition to cashew products. The finding suggests that income is a major determinant of value addition to cashew products. This is in conformity with the finding of Okebiorun and Jatto (2017) who reported that income has a positive and significant effect on cassava value addition among women processors in Ilesa West LGA, Osun State, Nigeria. Similarly, Agwu *et al*. (2015) found income to be highly correlated with the likelihood of adding value to cassava products in Abia State, Nigeria.

The need to earn higher income drives many processors to add value to cashew products. This view was also corroborated by Coltrain *et al*. (2000) who submitted that the desire to increase income generation from agricultural produce has motivated several farmers to seek more creative ways of improving value addition to their products. Fleming (2005) noted that value addition is particularly critical because it offers a strategy for transforming an unsuccessful agro-enterprise into a successful one. Thus the need for higher-income can influence value addition to cashew products because value-added cashew products guarantee higher consumer's patronage which sustains higher revenue.

4.3.1.3 Type of markets

The positive coefficients of type of markets in both models mean that expanding the type of markets access by processor increase the likelihood of adding value to cashew kernel, and both cashew products relative to cashew nut by 278, and 178 percent respectively. More so, type of markets for both models were

statistically significantly (P<0.05), suggesting it have a significant influence on value addition to cashew products. In other words, the number of markets access by the cashew processors determines the extent of value addition to cashew kernel, and both cashew products. The finding is in tandem with that of Tsalwa and Theuri (2016) who found that the type of market dealer access influences the degree of value addition.

The finding suggests that the extent of value addition to cashew products is determined by market destination. The specifications of buyers in the market(s) destination where cashew products are to be marketed determine to a reasonable extent the nature and degree of value to be added to the products. The reason being that cashew product attributes preferred by buyers vary across markets where they are domiciled.

Thus, cashew product attributes preferred by consumers located in the rural market may differ from that of a consumer located in the urban market. The observed consumer's attributes are factored into the value addition processes to reflect the consumer's product desirability in the market. Tsalwa and Theuri (2016) corroborated this view by stating that market destination determines the degree and extent of value addition to products. This is mainly due to the preferences and tastes of consumers in the products' market destination. Improving processors access to markets can increase investment in cashew value addition activities while enhancing their resourcefulness in meet diverse consumers' tastes and preferences.

4.3.1.4 Cashew physiognomies

Cashew physiognomies have a positive coefficient in the model with the probability of adding value to cashew kernel, and statistically significant (P<0.05),

implying that improving cashew physiognomies increases the likelihood of adding value to cashew kernel relative to cashew nut by 74.3 percent. Consumers' desire for cashew kernels with specific characteristics may have given rise to this result. However, the negative coefficient of cashew physiognomies in the second model means that it decreases the likelihood of value addition to both cashew products as against cashew nut, but significantly influence value addition to both cashew products ($P<0.05$).

Studies have shown that product characteristics influence consumer's purchasing decisions (Harris, 1997; Lautiainen, 2015; Adegbola, Adjovi, Adekambi *et al*., 2019). Understanding how these product characteristics influence consumer's preferences and patronage of a product could lead to the development of more acceptable cashew products. Employing technique that focuses on improving these product characteristics may lead to the processing of high valued cashew products with greater consumer's acceptance and patronage.

4.3.1.5 Processors' perception about government policy on cashew processing

The positive coefficients of processors' perception about government policy on cashew processing implies that favourable processors' perception about government policy on cashew processing is likely to increase value addition to cashew kernel, and both cashew products as oppose to cashew nut by 91.1, and 182.6 percent respectively. Meanwhile, the coefficient of processors' perception about government policy on cashew processing was significant ($P<0.05$) in the second model, confirming that it drives value addition to both cashew products. The finding concurs with that of Tsalwa and Theuri (2016) who reported that government policy is positively correlated with value addition to tea in Kenya. The

finding obviously shows the need for government to initiate and pursue policies that will serve as incentives for motivating individuals to engage in cashew value addition activities. Alluding to the above assertion, Madura (2006) opined that it is the sole responsibility of the government to create a conducive atmosphere for optimal growth and development of economic activities. It is therefore important that government policy on cashew processing should be favourably enough to impress positive perception on the processors so as to encourage greater value addition activities to cashew products.

4.3.1.6 Processors' perception about cost of processing technology

The coefficients of processors' perception about the cost of processing technology were significant ($P<0.05$) and negative for both models. The negative coefficients imply that processors perceive the cost of cashew processing as unfavourable as such diminishes the probability of adding value to cashew kernel, and both products with referent to cashew nut by 246.4, and 151 percent respectively. The high cost of many of the modern cashew processing technologies may have given rise to this result. However, the statistically significant ($P<0.05$) implies that processors' perception about the cost of cashew processing technology has a significant influence on value addition to cashew products. In a related study, Falola, Oyinbo, Adebayo, Jonathan and Jimoh (2016) averred those farmers who have processing equipment are more likely to add value to their produce than those who have not.

4.3.1.7 Market facilities

Market facilities showed positive coefficients in both models, indicating that increase provision of market facilities increases the likelihood of value

addition to cashew kernel, and both cashew products relative to cashew nut by 38.3, and 82.4 percent respectively. More so, the coefficient of market facilities in the second model – at both cashew products was significant ($P<0.05$), confirming that market facilities significantly influence value addition to both cashew products. Availability of market infrastructure is crucial for enhancing value addition to cashew products. In the words of Admassie (2015), well-functioning market infrastructure creates economic opportunities that encourage processors to specialise in adding value to agricultural commodities that they have a competitive advantage. Availability of electricity has been reported to increase the likelihood of value addition to tea in Kenya (Ntale *et al*., 2014). Furthermore, Ismail (2014) found that market infrastructure was significantly and positively correlated with small-scale farmers' decision to participate in market services.

4.3.2 Relative risk ratio (RRR)

The estimates from the multinomial logistic regression were further subjected to relative risk ratio analysis. According to Gallis and Turner (2019), the relative risk ratio is a measure of the relative association between the independent variable(s) and the response variable. The essence is to determine the ratio of the probability that the processor could choose to add value to the comparison category (cashew kernel and both cashew products) over the probability of choosing to add value to the baseline/reference category (cashew nut). Relative risk can be gotten by exponentiating the above multinomial equation to yield regression coefficients that are relative risk ratios for a unit change in the predictor variables (Diaz-Quijano, 2012).

Table 4.3: Relative risk ratio (RRR) of factors that influence value addition to cashew products processed in South-East zone of Nigeria

Value-added product	RRR	Std. Error	Z	P>|z|
Cashew nut	(base outcome)			
Cashew kernel				
Age	1.019	0.0347	0.59	NS
Education level	1.005	0.062	0.07	NS
Household size	0.338	0.134	-2.74	***
Monthly income	1.0001	0.00006	2.34	**
Processing experience	1.009	0.053	0.18	NS
Access to credit	0.499	0.410	-0.84	NS
Membership of coop.	0.944	0.486	-0.11	NS
Type of markets	16.150	6.256	7.18	***
Distance to market	1.035	0.037	0.96	NS
Cashew physiognomies	0.475	0.078	-4.54	***
Perception about Govt. policy	2.487	1.870	1.21	NS
Perception about cost of processing technology	0.085	0.033	-6.26	***
Market facilities	1.466	0.608	0.92	NS
Business strategic goals	0.942	0.165	-0.34	NS
Constant	202.22	845.68	1.27	NS
Both Cashew Products				
Age	1.044	0.0318	1.42	NS
Education level	1.002	0.059	0.04	NS
Household size	0.553	0.204	-1.60	NS
Monthly income	1.0001	0.00006	2.24	**
Processing experience	1.012	0.048	0.25	NS
Access to credit	0.619	0.486	-0.61	NS
Membership of coop.	0.654	0.320	-0.87	NS
Type of markets	5.935	2.232	4.74	***
Distance to market	1.015	0.035	0.42	NS
Cashew physiognomies	0.639	0.107	-2.69	***
Perception about Govt. policy	6.208	5.679	2.00	**
Perception about cost of processing technology	0.221	0.087	-3.84	***
Market facilities	2.279	0.924	2.03	**
Business strategic goals	1.012	0.168	0.07	NS
Constant	0.004	0.017	-1.27	NS

Number of obs = 353; LR chi2(28) = 379.61; Pseudo R^2 = 0.5563
Prob > chi2 = 0.0000; Log likelihood = -151.391

Note: *** and ** signify significant at 1% and 5% respectively; while NS signifies not significant
Source: This study (2020)

4.3.2.1 Age of processors

The relative risk ratio for any unit increase in age increases processors' preference to add value to cashew kernel, and both cashew products relative to cashew nut (Table 4.3). This suggests that if a processor age is increased by a year, the relative risk of choosing value addition to cashew kernel and both cashew products over cashew nut is expected to rise by a factor of 1.02, and 1.04 respectively. The finding indicates that increase in age will favour value addition to cashew kernel and both cashew products over cashew nut.

4.3.2.2 Educational level

The RRR that educational level of processors will increase their preference to add value to cashew kernel, and both cashew products over cashew nut is expected to rise by a factor of 1.01 and 1.00 respectively. The finding suggests that educated processors are more likely to choose value addition to cashew kernel, and both cashew products over cashew nut.

4.3.2.3 Household size of processors

The relative risk ratio for any increase in the household size of processors favoring to add value to cashew kernel, and both cashew products, as opposed to cashew nut, is expected to decrease by 0.34, and 0.55 factors respectively. Thus, large household size decreases the relative risk of value addition to cashew kernel, and both cashew products over cashew nut. In other words, a processor with a large household size is more likely to favour value addition to cashew nut over cashew kernel, and both cashew products.

4.3.2.4 Monthly income of processors

The relative risk ratio of monthly income being 1.0 at both models suggests that for every one-naira increase in monthly income increases processors

preference to add value to cashew kernel, and both products over cashew nut by 1.0 factor respectively. Therefore, processors with higher monthly income are more likely to choose value addition to cashew kernel, and both cashew products over cashew nut.

4.3.2.5 Processing experience

The relative risk ratios for processing experience were 1.01, indicating that an increase in processing experience by a year, decreases the relative risk for value addition to cashew kernel and both cashew products relative to cashew nut by a factor of 1.01 respectively. That is to say that processor with higher processing experience is more likely to add value to cashew kernel and both cashew products over cashew kernel.

4.3.2.6 Access to credit

The relative risk ratio for comparing processors with access to credit to those without access to credit favouring value addition to cashew kernel as well as both cashew products, as opposed to cashew nut, is expected to decrease by factors of 0.50 and 0.62 respectively. The finding suggests that processors who have access to credit are more likely to favour value aadition to cashew nut over cashew kernel, and both cashew products.

4.3.2.7 Membership of cooperative society

The relative risk ratios for comparing members of cooperative society to non-members when it comes to choosing value addition to cashew kernel as well as both cashew products as opposed to cashew nut are expected to decrease by factors of 0.94 and 0.65 respectively. The result implies that processors belonging

to a cooperative society have higher tendency than non-members to add value to cashew nut over and against cashew kernel and both cashew products.

4.3.2.8 Type of markets

The relative risk ratios for a unit increase in type of markets accessed by the processors favouring value addition to cashew kernel as well as both cashew products relative to cashew nut are 16.15 and 5.94. This implies that increasing processors' access to a wide range of markets will increase the relative risk for choosing value addition to cashew kernel, and both cashew products as opposed to cashew nut by 16.15, and 5.94 factors. That is to say, increase processors' access to wider markets increases the likelihood of value addition to cashew kernel, and both cashew products over cashew nut.

4.3.2.9 Distance to market

The relative risk ratios for distance to market were 1.04 and 1.02, meaning that every kilometre increase in distance to market will yield factors of 1.04 and 1.02 preferences for adding value to cashew kernel, and both cashew products respectively as opposed to cashew nut. In other words, processors with a longer distance to market are more likely to prefer adding value to cashew kernel, and both cashew products over cashew nut.

4.3.2.10 Cashew physiognomies

The RRR for a unit increase in cashew physiognomies for a processor favouring value addition to cashew kernel and both cashew products relative to cashew nut are expected to decrease by factors of 0.48, and 0.64 respectively. The finding suggests that processors with improve cashew physiognomies are more

likely to increase value addition to cashew nut over cashew kernel, and both cashew products.

4.3.2.11 Processors' perception about government policy on cashew processing

The relative risk ratios for processors' perception of government policy on cashew processing are 2.49, and 6.21. This shows that the relative risk for comparing processors with favourable perception to those with unfavourable perception about government policy on cashew processing when decisions about value addition to cashew kernel as well as both cashew products relative to cashew nut is expected to rise by factors of 2.49 and 6.21. The result suggests that processors with favourable perceptions about government policy about cashew processing are less likely to add value to cashew nuts.

4.3.2.12 Perception about the cost of cashew processing technology

The relative risk ratios for comparing processors who perceived the cost of cashew processing technology to be expensive as against those who perceived it to be inexpensive with regards to value addition to cashew kernel as well as both cashew products, as opposed to cashew nut, are expected to decrease by 0.09, and 0.22 factors respectively. Obviously, the result indicates that processors who hold the perception that the cost of cashew processing technology is expensive are more likely to add value to cashew nut over and against cashew kernel, and both cashew products.

4.3.2.13 Market facilities

The relative risk ratios for comparing processors who have access to market facilities as oppose to those who don't have for choosing value addition to cashew

kernel, and both cashew products relative to cashew nut are expected to rise by 1.47, and 2.28 factors. Thus, improving processors access to market facilities will increase the relative risk of adding value to cashew kernel, and both cashew products relative to cashew nut by factors of 1.47, and 2.28. Processors with greater access to improved market facilities are more likely to add value to cashew kernel, and both cashew products.

4.3.2.14 Business strategic goals of processors

The relative risk ratio for processors whose business strategic goals favour adding value to cashew kernel over cashew nut decreases by a factor of 0.94 as against the relative risk of those adding value to both cashew products that increases by 1.01 factor. The finding implies that business strategic goals are more likely to influence processors' decision to add value to cashew nut, and both cashew products over and above cashew kernel.

4.4 Effects of value addition strategies on the competitive advantage of cashew products processed in South-East zone, Nigeria

The concept of competitive advantage as applicable to this study is the ability of an individual processor to offer services and/or products that meet or exceed customer's preferences more than his/her competitors. This concept suggests that achieving a competitive advantage is possible if a processor is able to create cashew products that measure up with expected customers' values with distinctive attributes that distinguish it from that of its competitors. This is in line with extant literature. For instance, Persson (2015) found value addition to agricultural commodities as a potential means of actualizing competitive advantage. Similarly, de Chematony, Harris and Riley (2015) argued that value

addition has gained wide application as a strategy for accomplishing competitive advantage. Probit regression was employed to estimate the effects of value addition strategies on the competitive advantage of cashew products processed in the South-East zone, Nigeria.

The probit regression result yielded a Likelihood Ratio (LR) Chi-Square of 310.99 with a p-value of 0.0000, implying that at least, none of the independents' regression coefficients is equal to zero. In other words, it suffices to say that the model fits significantly better with these predictors than without the variables in the model (empty model without the independent variables) (Table 4.4).

Table 4.4: Probit regression result of the effects of value addition strategies on the competitive advantage of cashew products processed in South-East zone of Nigeria

Competitive advantage	**Coefficient**	**Std. error**	**Z**	**P>|z|**
Quality improvement stategy	0.427	0.057	7.43	***
Organizational growth strategy	-0.161	0.204	-0.79	NS
Packaging strategy	0.455	0.122	3.73	***
Sales strategy	-0.063	0.058	-1.08	NS
Constant	-2.263	0.460	-4.92	***

Number of obs = 353
LR chi2(4) = 310.99 Prob > chi2 = 0.0000
Log likelihood = -88.868621 Pseudo R2 = 0.6363
Note: *** indicates significant at 1% probability level.
Source: This study (2020)

4.4.1 Quality improvement strategy

The coefficient of quality improvement strategy employed by the processors was positive and significant (P<0.05). This implies that a quality improvement strategy increases the likelihood of achieving a competitive

advantage in value-added cashew products by 42.7 percent. Additionally, quality improvement strategy being statistically significant (P<0.05) signifies that it exerts a substantial effect on the competitive advantage of value-added cashew products. The result demonstrates that a quality improvement strategy is essential for achieving a competitive advantage in value-added cashew products. Thus, incorporating diverse quality improvement strategies into cashew value addition is critical to achieving a competitive advantage. It is therefore important that cashew processors should evolve a new strategy for improving the quality of cashew products. Besides achieving a competitive advantage, Demang, Salengke and Brasit (2018) averred that product quality improvement is vital for achieving higher prices while meeting customers' values. US Congress (2002) noted that the essence of value addition is to expand customers' range of choices over a product with the ultimate goal of increasing revenue from the derived product(s).

More so, improving cashew product quality can also be seen as a component of processing and marketing strategies that target customers' satisfaction through product innovation for enhancing return to processors. Product quality is a core determinant of customer's satisfaction which guarantees higher prices (Susant, 2013). The value addition that targets quality improvement strategy can help processors create unique cashew products that satisfy customers' desire which is vital for achieving competitive advantage.

4.4.2 Packaging strategy

The positive coefficient of the packaging strategy suggests it increases the likelihood of achieving a competitive advantage in value-added cashew products by 45.5 percent. The coefficient was equally significant (P<0.05), indicating that

packaging strategy has a significant effect on competitive advantage of value-added cashew products. This finding indicates that processors can achieve a competitive advantage from value-added cashew products by employing a packaging strategy. Rundh (2009) averred that packaging strategy is essential for achieving competitive advantage because it differentiates a firm's products from other brands and products. For instance, colourful/attractive container often portrayed in pictures influences processor to gain competitive advantage because of the picture effect on consumer's perception. Danielsson and Lundqvist (2011) opined that the use of colourful pictures on product packages can enable entrepreneurs to gain a competitive advantage. Similarly, Underwood, Klein and Burke (2001) averred that a product picture is part of an integral strategy for achieving competitive advantage. This is because pictures can easily communicate information about the product to consumers much faster than words can do.

In recent times, business organizations are increasingly realizing the importance of good packaging for creating impressive perceptions on the market sphere. Nikitaeva (2012) pointed out that packaging no longer serves as a mere container and protector of products but contributes positively to sales promotion by attracting the attention of customers to the products. The competitiveness of today's business environment suggests that the use of valuable and attractive packages is critical to influencing customer's purchasing decisions. Supporting this view, Ambrose and Harris (2011) averred that packaging is now another useful means of communicating a product's values to consumers. On the other hand, packaging strategy could also serve dual roles for achieving profitability and competitive advantage from value-added products. This aligns with the view of

Czinkota and Ronkainen (2001), that achieving profitability and competitive advantage requires a sort of packaging strategy that can deliver better value and satisfaction to consumers than that of their competitors. These double-barrel roles can be achieved by offering customers products with greater values, which justifies them paying a higher price. Thus, the packaging is part of the integral cashew value addition strategy for attaining profitability and competitive advantage.

4.5 Cost-benefit analysis of value-added cashew products

The cost-benefit analysis was used to ascertain the economic viability of value-added cashew products. The economic indices that were determined here are ratio statistics, income differential, rate of return to investment, and net return of value-added cashew products – raw nut, kernel, and both cashew products. The costs associated with the purchase of raw cashew nut and roasted kernel, labour, and transport constituted the variable cost, while the costs of assets such as frying pan, bowel, tray, jute bag make up the fixed cost, and the revenue represents earnings from sales of value-added cashew products. More so, the variability in the mean incomes of the processors was determined using ratio statistics. The summary of the analysis is presented in Tables 4.5– 4.6.

Table 4.5: Benefit-cost analysis of 1 kg of value-added cashew products

Items	Amount of value addition to 1 kg of cashew nut (₦ & US $)	Amount of value addition to 1 kg of cashew kernel (₦ & US $)	Amount of value addition to 1 kg of both cashew products (₦ & US $)
A. Total Variable Cost	6,671.7 (18.5)	6,899.0 (19.2)	6,632.7 (18.4)
B. Total Fixed Cost	133.3 (0.4)	256.4 (0.7)	233.1 (0.6)
C. Total Cost	6,805.0 (18.9)	7,155.4 (19.9)	6,865.8 (19.1)
D. Total Revenue	9,352.9 (26.0)	9,879.8 (27.4)	9,206.2 (25.6)
E. Gross Margin = D – A	2,681.2 (7.5)	2,980.8 (8.3)	2,573.5 (7.1)
Net income = E – B	2,547.9 (7.1)	2,724.4 (7.6)	2,340.4 (6.5)
Benefit Cost Ratio = D/C	1:1.4	1:1.4	1:1.3
ROR = $\left(\frac{D-C}{C}\right)$ x 100	37.4%	38.1%	34.1%
% of TVC	98.0%	96.4%	96.6%
% of TFC	2.0%	3.6%	3.4%

Source: This study (2020)
Note: Figures in parenthesis are in USD ($1 equivalent to ₦360)

Table 4.5 indicates that the average total cost of adding value to 1 kg of cashew products was slightly higher among processors adding value to cashew kernel (₦7,155.4 ($19.9)) than those adding value to both cashew products (₦6,865.8 ($19.1)) and least among those adding value to cashew nut (₦6,805.0 ($18.9)). Out of these total costs, the total variable costs range from > 96 percent in cashew kernel and both cashew products to ≤ 98 percent in cashew nut processing while the total fixed costs are < 4 percent. The finding shows that variable cost accounts for over 90 percent of the resources used for adding value to cashew products in the South-East zone of Nigeria. This suggests that the processors are still stuck to the traditional method of cashew value addition. Again, the processors do not own assets such as modern processing equipment and machines, which are used to enhance profiting from cashew value addition. Consequently, the

processors are most likely unable to access credit facilities from a financial institution because they lack assets that could have served as collateral. Thus, cost reduction measures involving cutting down of variable costs should be explored to enhance the return from value-added cashew products in the South-East zone of Nigeria.

The average revenues accruing as a result of value addition to 1 kg of cashew products exceed the respective total costs with processors adding value to cashew kernel achieving the highest revenue of ₦9,879.8 ($27.4), followed by those adding value to cashew nut – ₦9,352.9 (26.0), and least among those adding value to both cashew products (₦9,206.2 ($25.6)). Meanwhile, processors adding value to cashew kernel obtained the highest net income of ₦2,724.4 (US $7.6)/ 1kg, followed by those adding value to cashew nut with net income of ₦2,547.9 (US $7.1) and least are processors adding value to both cashew products (₦2,340.4 ($6.5)). These figures indicate that value addition to cashew products yields a high monetary reward. It is important to note that ordinarily, it is expected that processors adding value to both cashew products ought to achieve higher net income because of the utilization of the combined input. Apparently, this turns out not to be the case going the findings. The reason could be that processors adding value to a single cashew product – kernel or nut may have developed special skills that enable them to utilize resources in a way that enhance higher profit than those adding value to both products.

The benefit-cost ratios for adding value to 1 kg of cashew nut and cashew kernel were slightly higher (1:1.4) respective as against 1:1.3 obtained for those adding value to both cashew products. These ratios are above 1.0, suggesting that

value-added cashew products deliver positive net income to the processors. This further buttress the profitability of value-added cashew products with returns of 0.4, 0.4, and 0.3 kobos for every ₦1.0 invested in adding value to both cashew products, cashew kernel and cashew nut respectively. The finding is in tandem with that of Lawal, Oduwole, Shittu and Muyiwa (2010) who reported that cashew nut processing enhances household's revenue and income in Nigeria.

The analysis further shows the rate of return (ROR) for 1 kg of value-added cashew kernel was highest (38.1 percent), followed by that of cashew kernel (37.4 percent), and cashew nut (34.1 percent). This implies that the cashew processors adding value to cashew nut, cashew kernel, and both cashew products recoup returns of 37.4, 38.1 and 34.1 percent respectively from their capital investment. This finding is justified by Food and Agriculture Organization (FAO) (2008) that most small-scale agro-entrepreneurs prefer investing in enterprises with a minimum rate of return exceeding 30%. Conclusively, the finding shows that there is a higher monetary reward for adding value to a single cashew product – kernel or nut than combining both cashew products. This could be due to some degree of specialization that processors adding value to a single cashew product may have achieved.

4.5.1 Ratio statistics

The ratio statistics technique offers an all-inclusive list of summary statistics for describing the ratio between two scale variables. This tool is used to determine the uniformity ratio between revenue and cost among the three categories of cashew processors – cashew nut, cashew kernel and both cashew products so as to establish the degree of variability in each of the enterprises.

Table 4.6: Ratio Statistics Result for Revenue / Cost of value added cashew products

Group	Mean	Median	Coefficient of Dispersion	Coefficient of Concentration	
				Percent between 1 and 3 inclusive	Within 20% of Median inclusive
Cashew nut	1.340	1.427	0.115	98.8%	73.4%
Cashew kernel	1.377	1.427	0.097	100.0%	78.4%
Both cashew products	1.292	1.389	0.122	97.6%	68.3%
Overall	1.349	1.427	0.109	99.2%	73.9%

Source: This study data (2020)

The result shows that cost and revenue distribution ratios vary across the cashew processors (Table 4.6). The coefficient of dispersion (COD) in revenue/cost of value-added cashew products shows the least variability in cashew kernel (0.097) and greatest in both cashew products (0.122). Higher variability represents a higher risk (Healey, 2015). Thus the finding suggests that it is least risky to add value to cashew kernel and riskier to add value to both cashew products. More so, the result of within 20% of the median coefficient of concentration (COC) which reports the percentage of values within a certain percentage of the median equally confirms that the revenue/cost of value-added cashew kernel with the highest percentage (78.4) has higher uniformity and thus the less risky when compared to both cashew products (68.3 percent) and cashew nut (73.4 percent) enterprises which have higher variability.

4.6 Test of Hypotheses

4.6.1 Hypothesis one

The null hypothesis here was to test whether there are factors that influence value addition to cashew products processed in South East zone of Nigeria. From the result of multinomial logistic regression in Table 4.2, the Likelihood Ratio chi2(15) was 365.04 with P-value = 0.0000. Based on the significant difference of p-value, the alternative hypothesis was accepted that there are factors driving value addition to cashew products processed in South East zone of Nigeria. The factors are income, cashew physiognomies, type of markets, market facility, processors' perception about cost of processing technology and processors' perception about government policy on cashew processing which recorded statistically significant, proving that these variables significantly influence value addition to cashew products.

4.6.2 Hypothesis two

The third null hypothesis was to test whether value addition strategies employed by cashew processors in the South-East zone, Nigeria have significant effects on competitive advantage. The test result from the probit regression shows the Likelihood Ratio chi2(15) was 365.04, which is significantly different (P-value = 0.0000) (Table 4.4). Judging from the p-value, which is below 0.05, we conclude that value addition strategies employed by cashew processors in the South-East zone, Nigeria have significant effects on competitive advantage. In other words, the value addition strategies of the cashew processors have significantly influenced the attainment of competitive advantage in value-added cashew products.

4.6.3 Hypothesis three

Table 4.7: ANOVA result of income differential among processors adding value to cashew nut, kernel and both cashew products in South East, Nigeria

Value added cashew product	N	Mean	Std. Deviation
Cashew nut	173	20,959.54[a]	6,614.25
Cashew kernel	139	37,223.02[b]	31,362.08
Both cashew products	41	45,414.63[c]	32,386.71

F-value = 29,402; P-Value = 0.000

Means on the same column with different superscripts are significantly different. Mean separation was done using LSD tested at a 5% level of significance (P<0.05).

Source: This study data (2020)

The test result indicates that there was a significant difference between the means income of the processors adding value to cashew products. The LSD shows that incomes from processors adding value to cashew nut, kernel and both cashew products were significantly different ($P < 0.05$), suggesting unequal income generation among the three categories of processors, adding value to cashew products. Based on this, the null hypothesis was rejected and the alternative hypothesis accepted that there is a significant difference between the incomes of processors adding value to cashew products in South East zone of Nigeria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study analysed factors, cost-benefit analysis and effects of value addition strategies on cashew products processed in the South-East zone, Nigeria. The study was anchored on three (3) specific objectives respectively, which were to (i) determine factors that influence value addition to cashew products processed in South East zone, Nigeria; (ii) determine the effects of value addition strategies on competitive advantage of cashew products processed in South East zone, Nigeria; and (iii) determine the cost-benefit analysis, rate of return on investment and net income of cashew products processed in South-East zone of Nigeria. The study adopted a cross-sectional survey comprising multistage random and purposive sampling methods to select 353 cashew processors out of a population of 61,037. The sample size was determined using Krejcie and Morgan formula. The primary data employed for this study were generated through a structured questionnaire. The data generated were analyzed using appropriate econometric tools. Specifically, multinomial logistic (MNL) regression was employed to analyse objective I; objective II was achieved using probit regression while ratio statistics, benefit-cost ratio, gross margin and rate of return to investment was used to analyse objective III. The findings reveal that:

(i) Age, education level, monthly income, processing experience, membership of cooperative society, type of markets, market distance, cashew physiognomies, market facilities and policy of government about cashew processing are likely to increase value addition to cashew kernel relative to

cashew nut. Whereas age, educational attainment, experience from cashew processing, income from value-added cashew, type of markets, market distance, perception about policy of government on cashew processing, business strategic goals and market facilities are factors that increase the likelihood of adding value to both cashew products as oppose to cashew nut.

(ii) Meanwhile, the coefficients of type of markets, income from value-added cashew, cashew physiognomies as well as perception about cost of cashew processing technology being significant in both models were identified as variables that drive value addition to cashew products, confirming the hypothesis that these factors influence value addition to cashew products processed in South East of Nigeria.

(iii) The RRRs for education attainment, age of processor, monthly income, experience from cashew processing, type of markets, market, processors' perception about policy of government on cashew processing as well as market infrastructure being greater than one (RRR > 1), suggesting that these variables increase the processors' choice of adding value to cashew kernel, and both cashew products relative to cashew nut. While business strategic goals increase processors' risk of preferring to add value to both cashew products as oppose to cashew nut.

(iv) The coefficients of quality improvement and packaging strategies have a positive and significant ($P<0.05$) effect on competitive advantage, confirming the hypothesis that these value addition strategies are vital for achieving a competitive advantage on value-added cashew products.

(v) The cost-benefit analysis of value addition to 1 kg of cashew products shows the variable cost ranges between > 96 and < 99 percent. This suggests that the processors are still relying on traditional processing techniques and lack ownership of modern processing equipment. Consequently, they are unlikely to access credit facilities from a financial institution due to lack of ownership of valuable processing assets that could serve as collateral for loan procurement. Improving profit from value-added cashew products require a strategy for reducing the cost associated with variable cost.

(vi) The average revenues accruing as a result of value addition to 1 kg of cashew products exceed the respective total costs with processors adding value to cashew kernel obtaining the highest revenue of ₦9,879.8 ($27.4), followed by those adding value to cashew nut – ₦9,352.9 ($26.0), and least among those adding value to both cashew products (₦9,206.2 ($25.6)).

(vii) In a similar trend, processors adding value to cashew kernel obtained the highest average net income of ₦2,724.4 (US $7.6) per 1 kg, followed by those adding value to cashew nut (₦2,547.9 (US $7.1)) and least net income (₦2,340.4 (US $6.5) recorded those adding value to both cashew products. These figures indicate that value addition to cashew products yields a high monetary reward.

(viii) The benefit-cost ratios for adding value to 1 kg of cashew nut and cashew kernel were slightly higher (1:1.4) respectively than for those adding value to both cashew products (1:1.3). These ratios are above 1.0, suggesting that value-added cashew products deliver positive net income to processors.

(ix) Equally, the rate of return (ROR) for 1 kg of value-added cashew kernel was highest (38.1 percent), followed by that of cashew kernel (37.4 percent), and least in cashew nut (34.1 percent). This implies that the processors adding value to cashew nut, cashew kernel, and both cashew products recoup returns of 37.4, 38.1 and 34.1 percent respectively from their capital investment.

(x) Furthermore, the result of the ratio statistics as indicated by the coefficient of dispersion (COD) and coefficient of concentration (COC) confirms that the revenue/cost of value-added cashew products showed the least variability in cashew kernel (0.097) and greatest in both cashew products (0.122), suggesting that value addition to cashew kernel has the least risk while value addition to both cashew products has the highest risk.

(xi) The test of hypothesis confirmed that there is a significant difference between the incomes of processors adding value to cashew products (cashew nut, kernel, and both products) in the South-East zone, Nigeria.

5.2 Conclusion

The study analysed factors, cost-benefit analysis and the effects of value addition strategies on cashew products processed in the South-East zone of Nigeria. The results of the study showed that income, type of markets, cashew physiognomies, processors' perception about cost of processing technology and processors' perception about government policy on cashew processing have a significant influence on value addition to cashew products in both models, confirming the hypothesis that these factors influence value addition to cashew

products processed in South East zone, Nigeria. These factors represent important variables for improving value addition to cashew products.

The study established that the RRRs for education attainment, age of processor, monthly income, experience from cashew processing, type of markets, market, processors' perception about policy of government on cashew processing as well as market infrastructure being greater than one (RRR > 1), suggest that variation in any of these variables will likely influence the processors' favouring to add value to cashew kernel and both cashew products over cashew nut and vice versa.

Furthermore, the study affirmed that the quality improvement and packaging strategies have a significant and positive effect on the competitive advantage of value-added cashew products. Thus, confirming the hypothesis that value addition strategies increase the likelihood of achieving a competitive advantage on value-added cashew products. The study also showed that value addition to cashew products gives high monetary reward with processors adding value to cashew kernel obtaining the highest net income, followed by those adding value to cashew nut and least among those adding value to both cashew products. The study also revealed that there was a significant difference in the incomes of processors adding value to cashew products in South East zone, Nigeria with those adding value to both cashew products and cashew kernel obtaining higher income far and above those adding value to cashew nut. Therefore, confirming the hypothesis that there is a significant income differential among processors adding value to cashew products in South East zone of Nigeria.

Equally, the study confirmed that value addition to cashew products is not just profitable but economically viable with over 30 percent return on investment, which is high enough to keep processors in the business. Meanwhile, the variable cost of adding value to cashew products accounts for over 90 percent of the total cost of value addition to cashew products. The implications are that the cashew processors are still relying mainly on the traditional processing method and lack ownership of modern cashew processing equipment and machineries. Consequently, the processors cannot approach financial institutions for credit procurement due to lack of collateral. This could slow down the pace of value addition activity in the area. It is concluded that value addition to cashew products deliver positive net income and high monetary reward to processors as indicated by the values of benefit-cost ratios and rate of returns on investment. Thus, the study advocates the involvement of more individuals, particularly, unemployed people in value addition to cashew products because of its high rate of returns on investment.

5.3 Policy recommendations

One of the critical findings of this study was the identification of drivers of value addition to cashew products processed in the South-East zone of Nigeria. These factors are vital for developing a specific policy for stimulating the development of the cashew processing industry in Nigeria. This policy if initiated will serve as an anchor fulcrum for driving the much-needed revolution in the non-oil sector of the Nigerian economy using cashew which has a great export prospect for increasing foreign exchange earnings. It will also provide an incentive for potential investors across the cashew value chain – producers, processors, middlemen, marketers, transporters, exporters and service providers to invest in the

cashew industry. This is in line with the policy of the Federal Government of Nigeria, which emphasizes a shift from the export of sole-product (petroleum) to more robust and competitive products that is able to shield the nation's economy from global, regional and national uncertainties. Thus, cashew value addition presents a good opportunity for diversifying the Nigerian economy. It is on this premise that this study put forward the following policy recommendations:

5.3.1 Recommendations for objective one

The study observed that both the market facilities positively and significantly influence value addition to cashew products. State and Local Governments which have the constitutional obligations of superintending over markets should equip markets located within areas with high volume of cashew processing activities with modern market facilities such as processing and storage equipment among others and ensure they are available to processors to enhance value addition activities to cashew products.

The study established that income and type of markets are major drivers of value addition to cashew products. Processors are encouraged to explore access to a wider range of markets to enhance the marketing of their products for higher income generation.

The study equally established that cashew physiognomies is one of the factors influencing value addition to cashew kernel. It is therefore necessary that the government commission research for the development of cashew variety with desirable characteristics that influence value addition. The programme should include a strategy for getting cashew producers to grow and gradual replacement of the old stock with the released new variety.

The study revealed that perception about the cost of cashew processing technology is an important predictor of value addition to cashew products. Government should consider providing subsidies on cashew processing equipment and machineries to make it affordable for cashew processors, to increase access and use of such equipment for cashew value addition. Processors are equally encouraged to seek partnership as a group with local and international organisations like UNIDO and Bank of Industry to assist in procuring modern cashew processing equipment and machineries for them and negotiate repayment plan.

The positive correlation between government policy about cashew processing and value addition is an opportunity for Federal Government to develop a specific cashew improvement policy for driving cashew value addition programmes across the value chain – production, processing, and marketing. This policy will serve as a stimulant for increasing value addition activities to cashew products, thereby repositioning the Nigerian cashew industry from that of a low-priced commodity to supplier and exporter of high-quality value-added cashew products.

5.3.2 Recommendations for objective two

Quality improvement and packaging strategies were observed to have a positive and significant effect on competitive advantage of value-added cashew products. To ensure sustainable competitive advantage from value-added cashew, the processors are advised to explore training programmes that will enable them to improve quality of value-added cashew products while innovating cashew packs. The training should center on enhancing processors' capacity to improve product

quality to meet minimum health & nutritional safety of HACCP, meet international standardization and grading benchmark, and prolong products' shelf-life. More so, packaging training should focus on enhancing processors' innovating capacity to create colourful/attractive packs, moisture/tamper proof packs, durable packs and vacuum sealed packs in a manner that will protect and project the product value to consumers.

5.3.3 Recommendation for objective three

The study showed that variable cost constitutes over 90 percent of the total cost of adding value to cashew products. The processors are advised to consider forward market arrangement with the suppliers to reduce variable cost and guarantee some degree of price stability in raw cashew supply. Government can also organise training programmes for processors on ways of minimising the cost associated with variable items so as to free funds for the acquisition of modern processing equipment and machineries that could serve as security for credit acquisition and enhancing income generation from value-added cashew products.

Government should assist processors with the procurement of modern processing equipment and machineries to enhance income generation. The equipment can also serve as collateral for accessing credit from financial institutions.

More so, the government should design a programme that will encourage more people especially the unemployed to engage in cashew value addition activities because of its high rate of return to investment. This is in line with the government policy of job and wealth creation for reducing unemployment.

Government agencies like the SMEDAN can assist in creating awareness about economic opportunity in cashew processing.

5.4 Contribution to knowledge

This study sets out to analyse a wide range of institutional, socio-economic, business strategic goals, and product-related variables that influence value addition to cashew products using a discrete choice model (multinomial logistic regression). The uniqueness of this approach made it possible for this study to pinpoint the underlying factors influencing value addition to cashew products. These factors are important for developing a specific policy for improving the cashew value-chain industry.

This study was anchored on utility maximization theory. This theory without a doubt was able to explain how expected utility influence the processor's decision to add value to cashew products. However, the utility cannot be observed directly to generate data that can be used to benchmark whether the observed factors conform to the principles of the theory. Utility and choice are purely deterministic from the cashew processor's point of view. This study assumes that the factors influencing value addition to cashew products are stochastic, because some of the determinants of the utility are unobserved, which suggests that the choice can only be analysed in probability forms. To accommodate this shortcoming, neoclassical theory of firm involving a profit maximization model was introduced. It assumes that the sole objective of an agro-entrepreneur, in this case, a cashew processor is to maximize profit with a focus on a value addition technique that satisfies consumer's tastes and preferences. By so doing, expected utility is compensated by the choices made by economic agents like the consumers,

through sales revenue, which is observable in the principle of profit maximization model, involving only profit, derived from relationships between total cost, and gross revenue. In particular, a processor that aims to maximize profit also maximizes utility when value is added to cashew products. This is a departure from most studies that applied only utility maximization approach to analyse expected utility. This approach made it possible for this study to test a wide range of variables that influence value addition decisions and provides vital insights as to how the discrete choice model was used to specify factors that influence the likelihood of processors to choose from among cashew products to add value. The analytical technique adopted in this study is novel in its approach.

This study equally analysed the effects of value addition strategies on the competitive advantage of value-added cashew products. Apparently, it seems there have not been any empirical studies to prove how value addition strategies can be used to achieve competitive advantage particularly of micro and small scale agro-enterprises. More importantly, the increasing competition in the marketplaces, which appears to disadvantaged micro and small scale agro-enterprises due to their inability to compete with large scale firms with greater access to resources, makes it even crucial for this study. The far-reaching implication includes the struggle to achieve minimal profit and business failure, leading to the mortality of many micro and small scale agro-enterprises that are unable to compete. This makes this study a leading edge in providing empirical evidence that highlights how value addition strategies can be used to achieve competitive advantage in cashew processing enterprises. These strategies essentially enable processors to focus on creating product's values that are desirable to the customers. Thus, this finding provided a

guide for designing strategic policy for achieving competitive advantage in micro and small scale agro-enterprises. These strategies can also be extrapolated to achieve competitive advantage in small and medium scale agro-enterprises.

A fundamental issue to every investor when making an investment decision is how to determine costs associated with adding value to a product with the benefits and taking action based on the option that gives an investor the best return for his/her investment. The amount of economic returns as a result of value-added to cashew products is critical to potential investors. The use of cost-benefit analysis enabled this study to determine value-added cashew products with the highest and best return on investment based on the costs and resources involved. The application of rate of returns provided an additional economic tool that is beyond profit margin to determine percentage returns per investment in value-added cashew products. This information is helpful to potential investors for making an informed investment decision on value addition to cashew products. The fact that many of the small & medium scale investors often lack the technical and managerial competence needed for carrying out a feasibility study makes this study more imperative.

5.5 Suggestions for further research

Cashew nut and kernel are not the only components of cashew that value can be added. This calls for further studies to identify factors and constraints to value addition to cashew by-products and wastes, for example, cashew butter, broken nuts, CNSL for industrial and medicinal purposes and the juice of the cashew apple that can be further value addition. This will make way for entrant of new investors into the cashew value chain industry. Thereby, reducing wastages,

postharvest losses and opening a new frontier for more job opportunities, income generation and greater participation of rural households in the cashew value chain industry.

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APPENDIX I

QUESTIONNAIRE

Dept. of Agricultural Economics
School of Agriculture & Enterprise Development.
Kenyatta University
Kenya.

Dear Respondents,

I am a PhD student of the above institution, carrying out a research entitled: ***Analysis of Factors, Cost-Benefit Analysis and Effects of Value Addition Strategies on Cashew Products Processed in South-East Zone, Nigeria.***

I most humbly solicit your cooperation in completing this questionnaire. Please feel free to sincerely fill each of the questionnaire items as it affects you and your business. I assured you that the information offered in this questionnaire will be strictly used for the purpose of research alone and your response treatment with the utmost confidentiality.

Thanks for your anticipated cooperation.

Yours

Faithfully

Researcher

Questionnaire Serial Number: ……..
State: ……..
Mobile Number: ……
Date: ……..

Section A

1.1 What is your sex? 1 = male, 2 = female [ ]

1.2 What is your age (years) …….

1.3 What is your marital status? 1 = single, 2 = married, 3 = separated, 4 = widowed [ ]

1.4 What is your highest educational qualification? [ ] Note: number of years spent in formal education

1.5 What is the number of persons living under the same roof with you and feeding on you?.....

1.6 Have you ever access credit for boosting value addition to your cashew product(s)? 1 = yes, 2 = no [ ]

1.7 If yes, how many times have you access such credit and how much did you receive? [ ]

1.8 For how long have you been adding value to cashew product(s)? [ ]

1.9 What component of cashew part(s) do you add value to? 1 = nut, 2 = kernel, 3 = apple [ ], 4 = others, specify ……

1.10 How much do you make as income from the sale of your cashew product(s) on monthly basis? ……

1.11 Which of these markets do you sell your cashew product(s)? 1 = village, 2 = urban, 3 = regional, 4 = international, 5 = e-market [ ], 6 = Others specify, ……

1.12 What is the estimated distance from your processing site to the closest market (km)? .....

1.13 Do you belong to any cooperative society? 1 = yes, 2 = no [ ]

1.14 If yes, what type of cooperative society? ……

1.15 Which of these market facilities are available for marketing cashew product(s) marketing in your area? 1 = Accessible Roads, 2 = Modern Storage Facilities, 3 = Telecommunication, 4 = Stable electricity [ ], 5 = Processing equipment [ ], 6 = Other specify ……..……

1.16 What is your business strategic goal? 1 = Profit maximization, 2 = Product differential and branding, 3 = Increase market sales volume, [ ] 4 = others, specify …….

1.17 Have you received any government support on cashew value addition? 1 = yes 0 = no

1.18 What is your perception about the cost of cashew processing technology? 1 = very expensive, 2 = expensive, 3 = fairly expensive, 4 = not expensive, [ ]

1.19 Which of the cashew physiognomies/characteristics influence your decision to add value to the product(s)? 1 = perishability, 2 = brittleness, 3 = bulkiness, 4 = size, 5 = colour, [ ] 6 = others specify ……

Section B: Cost-benefits analysis of value addition to cashew products

2.1 Indicate from the under-listed using the appropriate code the cashew products you are involved in adding value to and its end-products

Cashew products	Cashew nut		Cashew kernel		Cashew apple	
Value added products	1 = cashew nut testa, 2 = cashew nut oil cake, 3 = cashew cheese, 4 = cashew kernel, 5 = cashew butter, 6 = cashew nutshell liquid (CNSL) 7 = others, specify 8 9 10		1 = animal feed, 2 = lubricant, 3 = roasted kernel, 4 = paint, 5 = others, specify 6 7 8 9 10		1 = cashew apple jam, 2 = cashew liquor/ alcoholic drink, 3 = cashew pulp in honey 4 = cashew sugar syrup, 5 = cashew flavour 6 = preservative 7 = others, specify 8 9	

2.2 Processing costs: Based on the type of cashew product(s) you add value to, estimate the costs associated with the processing of the product(s) per unit production in a month.

Items	**Unit**	**Unit cost (N)**	**Quantity**	**Total cost (N)**
Revenue				
Processed product(s) Cashew nut Cashew kernel Cashew apple				
Variable cost				
Cost of raw cashew Nut Kernel Apple				
Transportation				
Labour				
Packaging				
Fixed cost				
Depreciation on machinery				
Flying pans				
Jute bags				
Other processing equipment i. ii. iii.				

Section C: Strategies for improving value addition to cashew products for gaining competitive advantage in South East, Nigeria.

3.1 Kindly indicate from the under-listed, strategies that you have employed to enhance value addition to cashew products

Strategies	Use the codes to indicate the appropriate strategy
3.1.1 Quality Improvement Strategy:	
i. Hygienic practice [1]	
ii. Meeting international standardization and grading benchmark [2]	
iii. Long shelf-life [3]	
iv. Operational licence (NAFDAC Registration No.) [4]	
v. Meeting minimum health & nutritional safety of HACCP [5]	
vi. others, specify	
3.1.2 Organizational Growth Strategy	
i. Joint group venture/cooperative society [1]	
ii. Partnership business [2]	
iii. Entrepreneurship training [3]	
iv. others, specify	
vi.	
3.1.3 Packaging Strategy	
i. Colourful/attractive packs [1]	
ii. Moisture/tamper proof packs [2]	
iii. Durable packs [3]	
iv. Vacuum sealed packs [4]	
v. others, specify vi.	
3.1.4 Sales strategy:	
i. Advertising [1]	
ii. Trade fair and exhibition [2]	
iii. Sales promotion [3]	
iv. Door-to-door sales [4]	
v. E-marketing [5]	
vi. Personal contact sale [6]	
vii. Event sponsorship [7]	
viii. Point of purchase display [8]	
ix. Others, specify	

Overall, do you think these strategies have helped you to be ahead of your competitors in cashew value addition activity? 1 = yes [ ], 0 = no [ ]

3.2 Which of these strategies have you used to improve value addition in your cashew product(s) to have an edge over your competitors?

Strategy	**Yes = 1; No = 0**
3.1 Quality improvement strategy:	
i. Hygienic practice	
ii. Meeting international standardization and grading benchmark	
iii. Long shelf-life	
iv. Operational licence (NAFDAC Registration No.)	
v. Meeting minimum health & nutritional safety of HACCP	
vi. others, specify	
3.2 Organizational Growth Strategy	
i. Joint group venture	
ii. Partnership business	
iii. Entrepreneurship training	
iv. others, specify	
vi.	
3.3 Packaging strategy	
i. Colourful/attractive package	
ii. Moisture/tamper proof package	
iii. Durable package	
iv. Vacuum sealed packs	
v. others, specify	
3.4 Sales strategy:	
i. Advertising	
ii. Trade fair and exhibition	
iii. Sales promotion	
iv. Door-to-door sales	
v. E-marketing	
vi. Personal contact sale	
vii. Event sponsorship	
viii. Point of purchase display	
ix. Others, specify	

APPENDIX II:

MULTINOMIAL LOGISTIC REGRESSION RESULT

. vif

Variable	VIF	1/VIF
Household_~e	2.21	0.453298
Product_Xt~s	1.83	0.547388
Proc_tech	1.78	0.562506
Type_mkts	1.34	0.745552
Proc_Exper~e	1.29	0.777182
Monthly_in~e	1.26	0.793854
Age	1.25	0.798714
Edu_level	1.23	0.815955
Membership~p	1.10	0.908046
Access_cre~t	1.08	0.925972
Distance_mkt	1.05	0.954709
Mkt_facili~s	1.03	0.966453
Govt_policy	1.03	0.967841
Biz_strategy	1.02	0.983291
Mean VIF	1.32	

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Value_added_Prdt

chi2(1) = 0.02
Prob > chi2 = 0.8807

. dwstat

Durbin-Watson d-statistic(15, 29) = 2.438371

```
mlogit Value_added_Prdt Age Edu_level Household_size Monthly_income
Proc_Experience Access_credit Membership_coop type_mkts Distance_mkt
Prodt_xteristics Govt_policy Proc_tech Mkt_facilities Biz_strategy

Iteration 0:   log likelihood = -341.19545
Iteration 1:   log likelihood = -175.63231
Iteration 2:   log likelihood = -172.80046
Iteration 3:   log likelihood = -152.73611
Iteration 4:   log likelihood = -151.71153
Iteration 5:   log likelihood =  -151.3964
Iteration 6:   log likelihood = -151.39101
Iteration 7:   log likelihood =   -151.391

Multinomial logistic regression                 Number of obs   =        353
                  LR chi2(28)     =     379.61
                  Prob > chi2     =     0.0000
Log likelihood =   -151.391                     Pseudo R2       =     0.5563

------------------------------------------------------------------------------
Value_added_Prdt |      Coef.   Std. Err.       z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------
Cashew_nut       |  (base outcome)
-----------------+------------------------------------------------------------
Cashew_kernel    |
             Age |   .0187697   .0320463     0.59   0.558    -.0440399    .0815794
       Edu_level |   .0045607   .0620796     0.07   0.941     -.117113    .1262344
  Household_size |  -1.084559   .3963505    -2.74   0.006    -1.861391   -.3077259
  Monthly_income |   .0001345   .0000576     2.34   0.020     .0000216    .0002475
 Proc_Experience |   .0094635   .0524912     0.18   0.857    -.0934173    .1123444
   Access_credit |  -.6935564   .8209887    -0.84   0.398    -2.302665    .9155518
 Membership_coop |   .0580815   .5151015     0.11   0.910    -1.067662    .9514989
      Type_mkts  |   2.781928   .3873709     7.18   0.000     2.022695    3.541161
    Distance_mkt |   .0346076   .0360525     0.96   0.337    -.0360539    .1052691
Prodt_xteristics |   .7434884   .1638079     4.54   0.000    -1.064546   -.4224308
    Govt_policy  |   .9111079   .7520589     1.21   0.226    -.5629004    2.385116
      Proc_tech  |  -2.464322   .3936059    -6.26   0.000    -3.235775   -1.692869
  Mkt_facilities |   .3827751   .4147747     0.92   0.356    -.4301685    1.195719
    Biz_strategy |  -.0599138   .1747867    -0.34   0.732    -.4024895    .2826619
           _cons |   5.309364   4.181947     1.27   0.204    -2.887102    13.50583
-----------------+------------------------------------------------------------
Both products    |
             Age |   .0432958   .0304959     1.42   0.156    -.016475    .1030666
       Edu_level |   .0023644   .0587016     0.04   0.968    -.1126887    .1174174
  Household_size |  -.5927519   .3696391    -1.60   0.109    -1.317231    .1317274
  Monthly_income |   .0001292   .0000576     2.24   0.025     .0000163    .0002422
 Proc_Experience |   .0118793   .047575      0.25   0.803    -.0813659    .1051245
   Access_credit |  -.4797039   7856722     -0.61   0.541    -2.019593    1.060185
```

Membership_coop	-.4252213	.4894527	-0.87	0.385	-1.384531	.5340884
Type_mkts	1.780895	.3759822	4.74	0.000	1.043983	2.517806
Distance_mkt	.0144507	.0341981	0.42	0.673	-.0525762	.0814777
Prodt_xteristics	-.4481133	.1667443	-2.69	0.007	-.7749261	-.1213005
Govt_policy	1.82581	.914832	2.00	0.046	.0327717	3.618847
Proc_tech	-1.510111	.3937231	-3.84	0.000	-2.281794	-.7384281
Mkt_facilities	.8239477	.4055256	2.03	0.042	.0291321	1.618763
Biz_strategy	.0115347	.1657741	0.07	0.945	-.3133766	.336446
_cons	-5.552117	4.37015	-1.27	0.204	-14.11745	3.01322

APPENDIX IIb:

RESULT OF RELATIVE RISK RATIO

. mlogit, rrr

Multinomial logistic regression — Number of obs = 353
LR chi2(28) = 379.61
Prob > chi2 = 0.0000
Log likelihood = -151.391 — Pseudo R2 = 0.5563

Value_added_Prdt	RRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Cashew_nut	(base outcome)					
Cashew_kernel						
Age	1.018947	.0326535	0.59	0.558	.9569157	1.084999
Edu_level	1.004571	.0623633	0.07	0.941	.8894847	1.134548
Household_size	.338051	.1339867	-2.74	0.006	.1554562	.7351168
Monthly_income	1.000135	.0000576	2.34	0.020	1.000022	1.000248
Proc_Experience	1.009508	.0529903	0.18	0.857	.9108133	1.118898
Access_credit	.4997954	.4103264	-0.84	0.398	.099992	2.498153
Membership_coop	.943573	.4860359	-0.11	0.910	.3438114	2.589588
Type_mkts	16.15013	6.256089	7.18	0.000	7.558667	34.50696
Distance_mkt	1.035213	.037322	0.96	0.337	.9645883	1.11101
Prodt_xteristics	.4754525	.0778829	-4.54	0.000	.3448844	.6554516
Govt_policy	2.487076	1.870428	1.21	0.226	.5695547	10.86033
Proc_tech	.0850665	.0334827	-6.26	0.000	.0393297	.183991
Mkt_facilities	1.466348	.6082042	0.92	0.356	.6503995	3.305933
Biz_strategy	.9418457	.1646221	-0.34	0.732	.6686534	1.326657
_cons	202.2217	845.6803	1.27	0.204	.0557375	733681.6
Both Products						
Age	1.044247	.0318452	1.42	0.156	.98366	1.108565
Edu_level	1.002367	.0588406	0.04	0.968	.8934288	1.124589
Household_size	.5528039	.2043379	-1.60	0.109	.267876	1.140797
Monthly_income	1.000129	.0000576	2.24	0.025	1.000016	1.000242
Proc_Experience	1.01195	.0481435	0.25	0.803	.9218563	1.110849
Access_credit	.6189666	.4863048	-0.61	0.541	.1327095	2.886906
Membership_coop	.6536251	.3199186	-0.87	0.385	.2504412	1.705892
Type_mkts	5.935164	2.231516	4.74	0.000	2.840508	12.40136
Distance_mkt	1.014556	.0346958	0.42	0.673	.948782	1.084889
Prodt_xteristics	.6388323	.1065216	-2.69	0.007	.4607378	.8857678
Govt_policy	6.207819	5.679111	2.00	0.046	1.033315	37.29456

Proc_tech		.2208854	.0869677	-3.84	0.000	.1021008	.4778645
Mkt_facilities		2.279481	.9243878	2.03	0.042	1.029561	5.046845
Biz_strategy		1.011601	.1676974	0.07	0.945	.7309746	1.399963
_cons		.0038792	.0169528	-1.27	0.204	7.39e-07	20.35283

APPENDIX III:

PROBIT REGRESSION RESULT

. vif

Variable	VIF	1/VIF
Packaging_strat	6.58	0.252022
Org_growth	4.04	0.247421
Quality_im~v	3.03	0.330143
Sales_stra~y	2.96	0.337588
Mean VIF	4.15	

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of Compet_advantage

chi2(1) = 2.03
Prob > chi2 = 0.1537

. linktest

Iteration 0: log likelihood = -241.49416
Iteration 1: log likelihood = -47.205003
Iteration 2: log likelihood = -46.73698
Iteration 3: log likelihood = -46.73256
Iteration 4: log likelihood = -46.732559

Probit regression Number of obs = 349
LR chi2(2) = 389.52
Prob > chi2 = 0.0000
Log likelihood = -46.732559 Pseudo R2 = 0.8065

Compet_advantage	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_hat	1.00913	.0926376	10.89	0.000	.8275633	1.190696
_hatsq	.0370327	.0667665	0.55	0.579	-.0938273	.1678927
_cons	-.0923304	.2172855	-0.42	0.671	-.5182022	.3335414

. estat gof

Probit model for Compet_advantage, goodness-of-fit test

```
      number of observations =       353
 number of covariate patterns =         9
           Pearson chi2(4) =       103.31
             Prob > chi2 =         0.0000
```

. dwstat

Durbin-Watson d-statistic(., 29) = 1.819157

probit Compet_advantage Quality_improv Org_growth Product_improv Sales_strategy

```
Iteration 0:   log likelihood = -244.36216
Iteration 1:   log likelihood = -92.268671
Iteration 2:   log likelihood = -88.912839
Iteration 3:   log likelihood = -88.868634
Iteration 4:   log likelihood = -88.868621
Iteration 5:   log likelihood = -88.868621

Probit regression                                 Number of obs   =        353
                  LR chi2(4)      =     310.99
                  Prob > chi2     =     0.0000
Log likelihood = -88.868621                       Pseudo R2       =     0.6363

------------------------------------------------------------------------------
Compet_advantage |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------------
  Quality_improv |      .4267503   .0574388     7.43   0.000     .3141723    .5393282
     Org_growth |      -.1612358   .2040076    -0.79   0.429    -.5610834    .2386118
  Pack_strategy |      .4548257   .1220688     3.73   0.000     .2155752    .6940761
  Sales_strategy |      -.0625584   .0581336    -1.08   0.282    -.1764982    .0513814
           _cons |      -2.262794   .4603049    -4.92   0.000    -3.164975   -1.360613
------------------------------------------------------------------------------
```

APPENDIX IV:

RESULT OF RATIO STATISTICS

Ratio Statistics

Case Processing Summary

		Count	Percent
Value added product	Cashew nut	173	49.0%
	Cashew kernel	139	39.4%
	Both cashew products	41	11.6%
Overall		353	100.0%
Excluded		0	
Total		353	

Ratio Statistics for Revenue / Cost

Group	Mean	Median	Coefficient of Dispersion	Coefficient of Concentration	
				Percent between 1 and 3 inclusive	Within 20% of Median inclusive
Cashew nut	1.340	1.427	.115	98.8%	73.4%
Cashew kernel	1.377	1.427	.097	100.0%	78.4%
Both cashew products	1.292	1.389	.122	97.6%	68.3%
Overall	1.349	1.427	.109	99.2%	73.9%

APPENDIX V:

RESULT OF ANOVA

Oneway

Descriptives

Monthly Income

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Cashew nut	173	20959.5376	6614.25380	502.87240	19966.9418	21952.1334	12000.00	30000.00
Cashew kernel	139	37223.0216	31362.08437	2660.09728	31963.2018	42482.8414	15000.00	150000.00
Both cashew products	41	45414.6341	32386.70685	5057.95384	35192.1281	55637.1402	18000.00	140000.00
Total	353	30203.9660	24790.79022	1319.48063	27608.9088	32799.0232	12000.00	150000.00

ANOVA

Monthly Income

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31118560134.139	2	15559280067.069	29.402	.000
Within Groups	185214754313.453	350	529185012.324		
Total	216333314447.592	352			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Monthly Income

	(I) Cashew value added product	(J) Cashew value added product	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	Cashew nut	Cashew kernel	-16263.48401*	2620.29756	.000	-21416.9936	-11109.9745
		Both cashew products	-24455.09657*	3995.72577	.000	-32313.7502	-16596.4430
	Cashew kernel	Cashew nut	16263.48401*	2620.29756	.000	11109.9745	21416.9936
		Both cashew products	-8191.61256*	4088.28056	.046	-16232.2997	-150.9254
	Both cashew products	Cashew nut	24455.09657*	3995.72577	.000	16596.4430	32313.7502
		Cashew kernel	8191.61256*	4088.28056	.046	150.9254	16232.2997

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Monthly Income

	Cashew value added product	N	Subset for alpha = 0.05		
			1	2	3
Duncan[a,b]	Cashew nut	173	20959.5376		
	Cashew kernel	139		37223.0216	
	Both cashew products	41			45414.6341
	Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 80.289.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

APPENDIX VI: APPROVAL OF RESEARCH PROPOSAL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School

DATE: 30th July, 2020

TO: Mr. Eze Anayochukwu Victor
C/o Department of Agricultural Economics

REF: A99F/26211/2018

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

We acknowledge receipt of your Research Proposal after fulfilling recommendations raised by the Graduate School Board of 1st July, 2020.

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The forms are available at the University's Website under Graduate School webpage downloads.

By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D studies.

Thank you.

JULIA GITU
FOR: DEAN, GRADUATE SCHOOL

KENYATTA UNIVERSITY
OFFICE OF DEAN
30 JUL 2020
GRADUATE SCHOOL
P.O. BOX 43844-00100 NAIROBI

CC. Chairman, Department of Agricultural [illegible]
Registrar (Academic) Attn. Mr. Richard Chweya
Supervisors:

1. Dr. Ibrahim Macharia
   C/o Department of Agricultural Science & Technology
   Kenyatta University

2. Dr. Lucy Ngare
   C/o Department of Plant Sciences
   Kenyatta University

APPENDIX VII: RESEARCH AUTHORIZATION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: A99F/26211/2018 **DATE:** 30th July, 2020

The State Coordinator,
Agricultural Development Programme,
Onuebonyi, Abakaliki
EBONYI STATE, NIGERIA.

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. EZE ANAYOCHUKWU VICTOR – REG. NO. A99F/26211/18

I write to introduce Mr. Eze Anayochukwu Victor who is a Postgraduate Student of this University. He is registered for Ph.D. degree programme in the **Department of Agricultural Economics.**

Mr. Eze intends to conduct research for a Ph.D. thesis Proposal entitled, **"Analysis of Factors and Effect of Value Addition Strategies on Value Added Cashew Products Processed in South-East Zone, Nigeria."**

Any assistance given will be highly appreciated.

Yours faithfully,

KENYATTA UNIVERSITY
OFFICE OF DEAN
30 JUL 2020
GRADUATE SCHOOL
P.O. Box 43844-00100 NAIROBI

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

APPENDIX VIII: LETTER OF INTRODUCTION

EBONYI STATE AGRICULTURAL DEVELOPMENT PROGRAMME (EBADP)

PMB 040, ONUEBONYI, ABAKALIKI, EBONYI STATE, NIGERIA

Our Ref No:..... Your Ref:..... Date:. 24/08/2020

.....

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.....

LETTER OF INTRODUCTION: MR. EZE ANAYOCHUKWU VICTOR

We wish to introduce Mr. Eze Anayochukwu Victor to you as a student of Kenyatta University, Kenya who is undertaking a PhD research on "***Analysis of Factors and Effects of Value Addition Strategies on Cashew Products Processed in South-East Zone, Nigeria***".

As part of his research, he wishes to administer questionnaire on cashew processors in South East zone, Nigeria for the purpose of collecting the relevant information that will aid his study.

Kindly accord him the necessary assistance.

Thank you.

Dr. Emmanuel Nwankwegu
State Coordinator,
EBADP, Abakaliki

24-08-2020

EBONYI STATE