

Agri food Efficiency Marketing Systems: A Case Study of Efficiency of Market organizational structures of macadamia industry in Central Kenya Highlands.

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ABSTRACT: *The macadamia industry in Kenya is a complex one with many diverse interested players, all fighting for the control of Macadamia market, which is assumed to be very profitable against a background of few drying and processing factories having being closed in the last few years. This study assessed the risks and costs involved in marketing while trading on macadamia nuts in the various stages within the long chain which also affects the efficiency of macadamia marketing systems. The study indicated how low quality levels of nuts affects processors ability to enter into contract in the international market, which in turn affects both large and small-scale farmers decreasing market share further. The research found that the future of macadamia industry in Kenya will not depend on the increasing production of raw nuts alone but rather on the ability to develop efficient marketing systems across the whole chain. It is necessary for the country to regain export global market position number two having moved to current position number four in the last few years. This calls for better and relevant educational training to farmers to meet the international market quality standard requirements. International trade in relations to the macadamia industry is important as more than 60% of all processed nuts (Kernel) are exported. The average Sound Kernel Recovery (SKR), of between 18% and 20% for Kenya raw nuts is far too low compared to 30 and 33 percent for Australia and South Africa respectively, which makes Kenya kernel to have comparatively very low market value in the international market. The Government of Kenya ban on export of Nuts in shell (NIS) clearly indicates that there is a major problem of market, which has not been addressed to by a liberalized market. Hence there is need to study market systems of the macadamia with the aim of establishing their efficiency. This study relied on primary data from five market channels; farmers, processors, wholesalers, retailers, and consumers, which were collected using multi-stage sampling system from the five stratified counties. Information was collected from 292 respondents using 32 market centers and structured questionnaires to supplement econometric tests, which could reflect factors that inhibit market efficiency. Various methods which included regression analysis, price transmission, integration, price correlation, margins and structure conduct and performance (SCP) analysis were used to measure and analyse the efficiency of market systems of macadamia in the central Kenya Highlands. The data was analysed further using SPSS version 12 and Microsoft excel to determine whether macadamia price movements between the five market channels and five counties reflected a competitive market system, which was used as an indicator of market efficiency. The analysis carried indicated that market efficiency of macadamia was low. The study was to benefit traders who would get properly analysed data to assist in making informed decisions. The Government of Kenya was also to benefit by using the same data in the policy formulation.*

I. THE BACKGROUND OF THE STUDY

Macadamia was introduced in Kenya in 1946 by Bob Harries on trial basis, and planting as complimentary cash crop to coffee began in central, Eastern and Coast provinces (Harris, 2004). Commercial farming was introduced in late sixties by ministry of Agriculture with no research done to find suitable varieties or proper market channels (Government of Kenya, 2007). Farmers were encouraged to plant macadamia in believe that the income from macadamia will be comparable or better than coffee and Tea which were main cash crops, and yet there was no single processor in Kenya until when Kenya Nuts company was registered in 1974 and started operations in 1977 (Kenya Nut Company 2007). Macadamia is currently treated as one of the scheduled crops (Kenya Gazette, 2010). The future of macadamia industry in Kenya does not depend on the increasing production of raw nuts alone but rather on the ability to develop efficient marketing systems across the whole chain. It is necessary for the country to regain global market position number two having moved to current position number four in the last few years. This calls for more and better educational systems to farmers in relation to the international market quality requirements. International trade in relations to the macadamia industry is important because share ratio of export and domestic market for macadamia is 99% and 1% respectively (HCDA, 2011). The Sound Kernel Recovery (SKR), of between 18% and 20% for Kenya raw nuts

is far too low compared to 30 and 33 percent for Australia and South Africa respectively, which makes Kenya kernel to have comparatively very low market value in the international market. The Government of Kenya (GOK) ban on export of Nuts in shell (NIS) clearly indicates that there is a major problem of market, which has not been addressed to by a liberalized market. Hence there is need to study market systems of the macadamia with the aim of establishing their efficiency.

The agricultural sector in Kenya is made up of four major sub-sectors, namely; industrial crops, horticulture, livestock and fisheries which make the sector the leading contributor to the Kenyan economy (Horticulture Development Authority, 2013) Macadamia nuts are included in the horticulture sub sector in agricultural sector in the Kenyan economy. The horticulture sub-sector contributes 36 per cent of Kenya's agriculture's Gross Domestic Product (GDP) and is a significant contributor to the economy. According to Ministry of Agriculture (2011) survey done showed that macadamia nut industry contributed 38% of overall nut value produced in Kenya and employed more than 100,000 people at the time of that survey. This is vital in the Kenya Vision 2030 (GOK, 1999)

1.0 Statement of the problem

Kenya has been named alongside Australia, Malawi, Guatemala, Brazil and Hawai'i as the countries that have contributed towards a global surge in macadamia production Gitonga et al (2009). Despite of good global performance of macadamia, the value chain of macadamia in Kenya is faced with numerous challenges domestically. These challenges range from lack of adequate promotion and advertising, lack of proper marketing organizational structures, lack of proper development of domestic markets, absence of pricing policies to guide the traders' profit margins, lack of quality control systems and lengthy marketing chains. All these challenges have contributed to the dismal performance of macadamia both locally and internationally. The problem has been compounded by the import ban of the Kenyan kernel by the USA and China. These challenges prompted the Kenyan government to impose export ban of raw nuts from (2008) to date and appointed a task force in (2011) to look at the teething problems in macadamia marketing. A trend of market loss in the market share in the international market is a problem and a big challenge to the macadamia industry. These problems require proper market analysis, assessment and investigation to reverse the downward trend. These are the gaps that this study tried to fill.

1.2. Research Objectives

Broadly, this study sought to assess and study multi- factor marketing activities and main players that impact and affect the value chain efficiency of Macadamia marketing system in Kenya, with a specific focus on the stratified counties in the central Kenya highlands.

1.2.1. The specific objectives were to:

Evaluate the impact of infrastructure and organisational barriers on efficient macadamia market systems.

Examine the flow of information between pairs of market centres and between pairs of traders and their impact on macadamia marketing systems.

Evaluate the level and impact of quality control standards on macadamia market efficiency

Analyse price policies and the speed of price transmission of macadamia prices between various market centres in the selected counties.

Assess the level of market concentration and integration between pairs of traders and market centres

Evaluate the impact and level of promotions, and advertising employed in the macadamia trade.

Analyse the percentage of margins earned by traders and roles they play to earn the margins and whether they are excessive

II. LITERATURE REVIEW

The review looks at the problems faced by marketing of macadamia and covers specific challenges related to macadamia .The review looks at the Kenya's economy structures, marketing systems, quantity control systems, pricing systems and margins made by traders. The review also outlines the missing gap in previous studies related to macadamia marketing.

2.0. The Global Situation

Kenya's economy is and will remain a mixed economy. The government has for long recognized the indispensable qualities that the private sector plays in the development. This is reflected in the government's Sessional Paper No. 1 (GoK, 1986) which states that agriculture and informal sector employs over half of the country's labor force. The paper further states that only the private sector when guided by price signals and other incentives set by the government can make and implement the myriad of decisions required to run the economy effectively and efficiently. Unfortunately, against the above principle the government imposed an

export ban on raw nuts, in 2009 (GoK, 2009), and apparently market forces have failed to address such limitations. The proposed study on market systems aims at evaluating the efficiency of various market systems to determine whether the forces of free market are weak or strong in relation to stated government policy and Kenya vision 2030 (GoK, 2007).

Macadamia nuts demand is higher than actual production because the current market is not representative of relatively competitive level, (Muthoka et al., 2006). A report by KARI (2006) identified marketing as the major problem although no statistical data to support the conclusion were given. Dorran (2001) in his macadamia guide and harvest care carried out in South Africa for South African Macadamia Growers Association addressed both technical and theoretical limitations of the lay farmer who usually faces challenges in maintaining quality of nuts in shell and concluded that farmers should be educated simply and comprehensively with the latest information to enable them reduce inefficiency which causes losses. This study is therefore relevant to market efficiency on quality since the average sound kernel recovery (SKR) of Kenya's farmers of 18% to 20% compares poorly with South Africa's and Australia's which averages 33% and 30% respectively (Noleen, & Wilma 2005). The low quality of kernel in Kenya is of great concern to macadamia traders because it determines the end product value, a challenge that the government has highlighted through the policy paper of 2003 (GoK, 2003).

Expansion and development of sustainable macadamia nut in Kenya, was a private public partnership (PPP) between Kenya Agriculture Research Institute (KARI) and Freshco Kenya Limited, (2005) which states that "the demand exceeds supply as only limited countries can grow the crop". The proposed study will thus investigate and carry out detailed analysis on the subject to fill the missing gap. Warfield, (1994) carried a market research for Australian Macadamia Society (AMS) to identify what barriers existed with regard to using and stocking macadamia nut products and identify how macadamia industry could improve their marketing activities and service. The research found that the macadamia product was perceived as being too expensive and Australian industry faced challenges with anticipated excess supply, a possible erosion of traditional export markets, and an undeveloped domestic market. The stated problems are akin to Kenya's macadamia industry and the study is relevant to the current marketing efficiency study.

Table 2.1: Trend of Macadamia Nuts Production in Kenya (2000-2011)

Year	Area HA	Prod. MT	Value KSH	KSH	Value KG KSH
2002	854	4,359	95,830,000	21,984	21.98
2003	2213	10,179	124,993,000	12,279	12.28
2004	2150	11,941	493,595,000	41,336	41.34
2005	2591	18,137	1,088,220,000	60,000	60.00
2006	2935	20,545	1,222,850,000	59,518	59.52
2007	2801	19,607	962,080,000	49,068	49.10
2008	3382	19,290	547,330,000	28,374	28.37
2009	2183	16,769	421,907,000	25,153	25.15
2010	3950	19,229	1,250,000,000	65,000	65.00
2011	5,640	26,634	2,277,000,000	85,000	85.00

Source: Nation Bureau of Statistic KNBS, (2011) and HCDA (2013)

Area=Hectors Production = Metric tons; = Kenya shillings

2.1 Nuts Production in Kenya

The Government of Kenya report (GoK, 2007) states that, nuts production is influenced by market prices. Table 2.2 shows a steady increase in production area (Hectares) and (SKR) volume in (Mt) but a very unsteady price trend. In the year 2005, the average price per Kg was as high as Kshs. 60 per Kg of nut in shell while in 2008, the average price per Kg was Ksh 28.37 which is a decline of more than 100% which might have been caused by the ban on export of raw nuts. The proposed study is to assess and analyze these price fluctuations to find whether there is correlation between increases of production and increase of sale prices and vice versa in the Central Kenyan Highlands.

2. 2. Changing Business Environment

Fragmentation of the consumer market means that the markets of developed nations no longer value 'boat-loads' (Hughes, 2004) of undifferentiated products. Government intervention in market protection and international trading arrangements is lessening and also ease of accessing financial resources has increased. Improved logistic capabilities are resulting in increased international competition; meaning that businesses have to be globally competitive whether supplying domestic or international markets. Changes in the retail, food service and food manufacturing sectors have resulted in the need for suppliers to develop capabilities required to meet customers' changing demands concerning volume, price and quality (Fearne, Hughes & Duffy, 2000).The

impact of an increasingly international agri-food industry is drastically reducing the effectiveness of governance structures and approaches that have historically benefited the agri-food industry. The traditional business approach has been one of seeking to operate under market inefficiency which is akin to current macadamia trade in Kenya.

Global markets impact on efficiency of local market organizational structures.

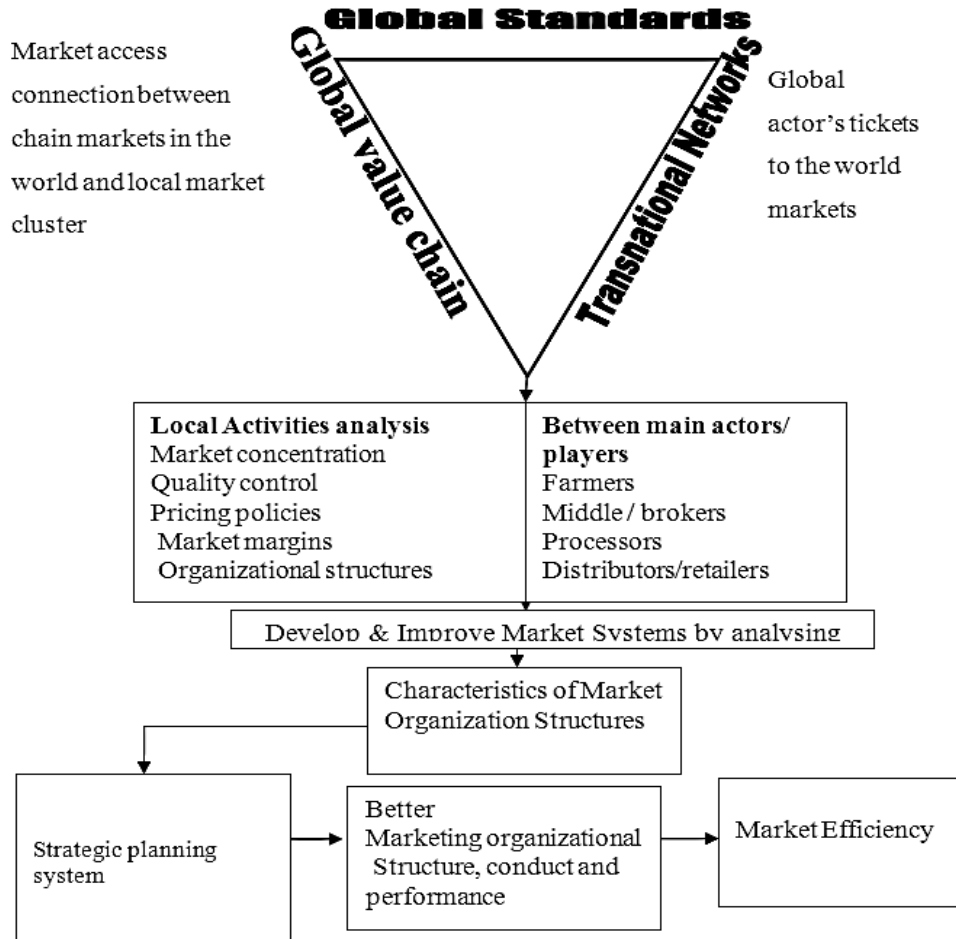


Figure 2.1 .Theoretical Framework

Adapted from Social Marketing theory (Porter, 2000) and interlinked with World Economic Triangle concept (Messner, 2002 and Schmitz, 2000).

2.1 Conceptual Framework

The conceptual framework tries to interlink the main market players with the marketing activities for both local cluster and global market segments as shown in Figure 2.1 which correlates well with theoretical framework figure 2.1 for better efficiency of agrifood marketing in Kenya. The conceptual framework figure 2.2 is a broad and proper characteristic analysis of vertical and horizontal coordination of independent and dependent variables which impact on efficiency of macadamia marketing system in Kenya to develop macadamia industry.

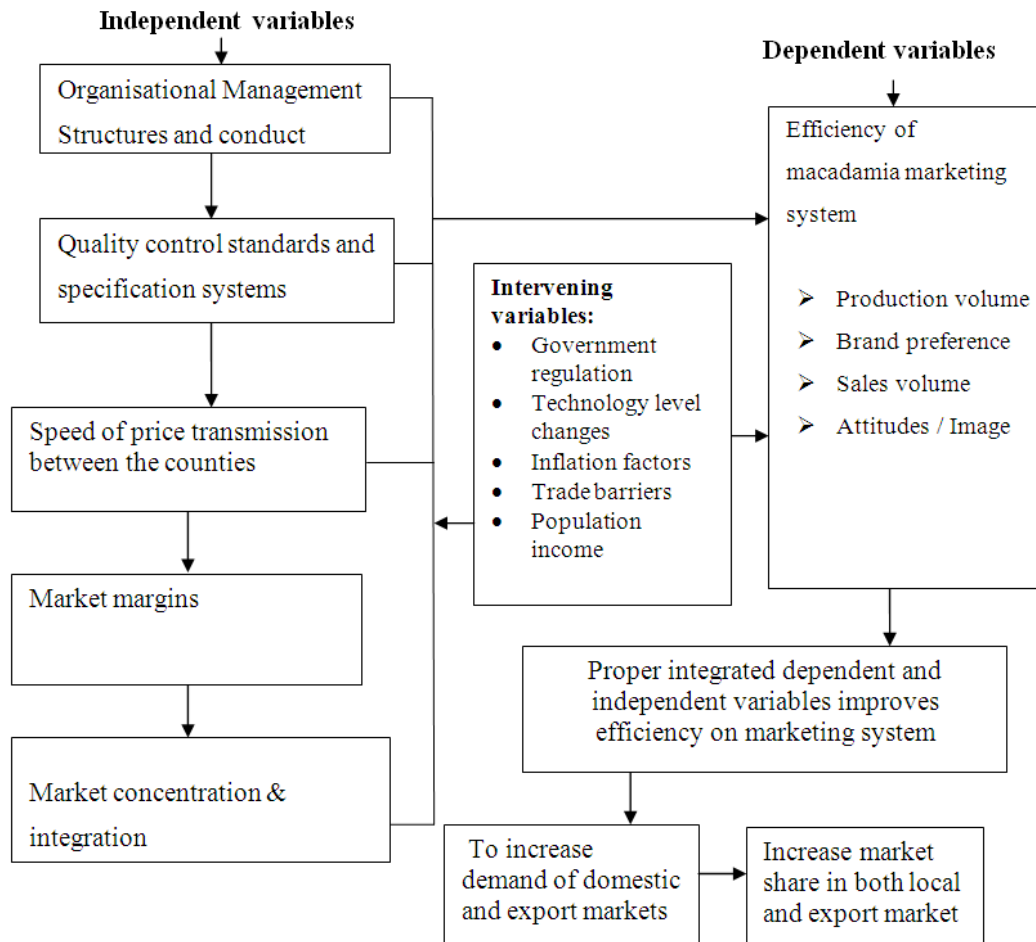


Figure 2.2: Conceptualized Relationship between dependent and independent Variables which were moderated by intervening variables

Source: Compiled by the researcher

III. RESEARCH METHODOLOGY

3.0. Research Design

The study adopted an exploratory approach using a descriptive survey design because it describes the state of events based on the responses from the respondents. Descriptive research design relied on both qualitative and quantitative methods of data analysis in describing phenomena. In this study, inferential statistics and measures of central, dispersion, distribution and percentages were applied. This method enabled the researcher to assess and study multifactor variable activities and main market channels that contribute to the efficiency of macadamia marketing system in central Kenya highlands.

3.1. Target Population

The targeted population was 2587 macadamia traders. The target population of the study included the following: 1620 macadamia farmers, 280 middlemen, 7 macadamia processors, 30 distributors and 650 consumers. This target population helped the researcher to assess the level of efficiency of macadamia marketing system in Kenya. The size of the target population was computed from secondary data obtained and extracted from Nyeri and Embu Towns which were provincial Head quarters then and verified later in Ministry of Agriculture & Livestock Development and Kenya National Bureau of Statistic annual returns in their respective Head offices in Nairobi. Respondents from each of the five stratified levels were distributed across the five counties in this study

3.2. Sampling procedure and sample Size

The study employed both stratified and multistage random sampling technique to draw the sample of respondents. Simple random sampling helps to avoid bias and all the units of targeted population had an equal chance of being selected (Orodho, and Kombo, 2004). According to Mugenda & Mugenda (2012) sampling is a process of selecting a number of individuals or objects from a population such that the selected group contains

elements representative of the characteristics found in the entire group and further argue that for descriptive study 10% of the accessible population is adequate. The sample size was drawn from the five stratified counties for the purposes of this study based on the same principle. The actual sampling distribution is indicated in table 3.1.

Table 3.1: Sample size and data collection in the five counties

	Kirinyaga	Kiambu	Nyeri	Muranga	Embu	Population Frequency	% of the Population
Farmers	44	41	33	28	16	162	10%*
Middlemen	7	7	6	5	3	28	10%*
Processors	1	4	0	1	1	7	100%
Retailers	5	7	7	5	6	30	100%
Consumers	10	14	14	15	12	65	10%*
Total	67	73	60	54	38	292	–

*Shows random samples percentage taken from total targeted population from the five market channels.

3.3. Data Collection Instrument

The primary data for analyses was obtained from the respondents through the use of questionnaires and individual interviews. The interviewer pursued in-depth information around the topic. Interviews were developed in order to obtain as much information from the respondents as possible.

3.4. Reliability of the Instruments

Reliability was used to measure how consistent the results from the pre- test were. The researcher employed test-retest method to test reliability. All categories of the respondents were selected from the area of study and questionnaires were distributed to the respondents to fill and then questionnaires and the responses were scored manually. The results from the two tests were correlated using the Spearman-Brown formula which gave correlation coefficient as 0.89 which was considered satisfactory to make conclusions for the study.

The questionnaires contained both close-ended and open-ended questions. A Questionnaire with open-ended and closed- ended questions allows every possible question to have a response (Bernard & Ryan, 2010).

3.5. Empirical Mode

Various models were used to analyse market efficiency which included: Correlation analysis, ANOVA, Regression analysis, Asymmetric price transmission, market structure, marketing margins and index of marketing efficiency.

IV. EMPIRICAL FINDINGS

The data analysed presents the research findings of macadamia marketing system in Kenya.. In analysing the research data, thematic content analysis was employed. Thematic analysis goes beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas within the data, in terms of themes (Bernard and Ryan, 2010)

4.0. Response Rate

The rate of response from all the five market channels was on average over 80% which was considered satisfactory to make conclusions for the study.

4.1.1. Demographic Information of the Respondent

This section presents demographic information of respondents considered crucial for subsequent discussions such as gender, age, and educational levels.

Table 4.1: Gender and age of Respondents

Designation	Gender				Percent (%) Distribution by Age group					
	Male		Female		<20 Yrs	21-29	30-39	40-49	>50 Yrs	Freq
	Freq.	Perc.	Freq	Perc						
Farmers	90	55.6	72	44.4	2.5	9.9	27.2	24.7	35.8	162
Middlemen	21	75.0	7	25	0	32.1	42.9	17.9	7.1	28
Processors	4	57.1	3	42.9	0	14.3	71.4	14.3	0	7

Retailers	17	56.7	13	43.3	0	70.0	23.3	6.7	0	30
Consumers	34	52.3	31	47.7	12.3	40.10	21.5	16.9	9.2	65

4.1.2. Gender of the Respondents

The gender of the respondents was an important component of this study as it revealed the categories of people involved in the macadamia business. Table 4.1 shows the gender of the respondents alongside their designation. The analysis above shows that out of the 162 farmers who took part in this study, 90 (55.6%) were male while 72 (44.4%) were female. Among the 30 retailers, 17 (56.7%) were male while 13 (43%) were female. The rest of the gender across designation was as indicated in the table 4.1.

Table 4.2. Ages of Respondents

	Farmers		Middlemen		Processors		Retailer		Consumer	
	F	%	F	%	F	%	F	%	F	%
Below 20 year	4	2.5	-	-	-	-	-	-	8	12.3
21-29	16	9.9	9	32.1	1	14.3	21	70.0	26	40.0
30 – 39	44	27.2	12	42.9	5	71.4	7	23.3	14	21.5
40 – 49	40	24.7	5	17.9	1	14.3	2	6.7	11	16.9
Over 50 years	58	35.8	2	7.1	-	-	-	-	6	9.2
Total (N)	162	100	28	100	7	100	30	100	65	100

4.1.3 Age of the Respondents

7.1.4% Processors were 30 – 39 years of age, 70% of retailers were 21 – 29 years while 40% of the consumers were 21 – 29 years of age. None of the middlemen, processors and the retailers was below 20 years of age. The age of the respondents was also considered as crucial element in this study. Scholars have noted that age may influence participation of activities and access to resources (GoK, 2007).The researcher, therefore, asked the respondents to indicate their age bracket and the results are presented in the table 4.1 above. The findings indicated that 35.8% of the farmers were over 50 years, 42.9% of the middlemen were 30 – 39 years old, 71.4% of processors indicated that the respondents were well experienced in farming and marketing macadamia nuts and hence they were suitable for this study. Macadamia industry was mainly dominated by men as shown in table 4.1 above. 55.6% of the farmers, 75.0% of the middlemen, 57.1% of the processors, 52.3% of the consumers and 56.7% of the retailers were men.

4.1.4. Education Level of the Respondents

Education affects the level of participation and implementation of extension program services and logistics of handling agricultural technologies. The findings are shown in table 4.2.

Table 4.2: Education level for respondents

Level of Education	Designation									
	Farmers		Middlemen		Processors		Retailers		Consumer	
	F	%	F	%	F	%	F	%	F	%
None	-	-	-	-	-	-	-	-	-	-
Primary	47	29	6	21.4	-	-	-	-	4	6.2
Secondary	74	45.7	16	57.1	-	-	9	30.0	24	36.9
College	23	14.2	3	10.7	3	42.9	20	66.7	23	35.4
University	1	0.6	2	7.1	1	14.3	1	3.3	13	20.0
No response	4	2.5	1	3.6	3	42.9	-	-	1	1.50
Total	162	100.	28	100.0	7	100.0	30	100.	65	100.0

Source: survey Data

The table above indicates that 45.7% of the farmers, 57.1% of the middlemen and 36.9% of the consumers had secondary level education while 66.7% of the retailers and 42.9% of processors had college level education. These findings show that macadamia marketing agents are fairly well educated to understand the marketing system of macadamia nuts.

4.1.5 Correlation between Information Age and Education Level

Considering the fact that adequacy of information is a determinant in the efficiency of macadamia marketing, the study sought to establish whether age and level of education had an effect on the level of satisfaction of the

information that the respondents received. Using multifactor analysis against the respondents' views on the adequacy of market information, the findings are presented in table 4.3 below

Table 4.3 Market information flow according to age and education level

	Farmers		Middlemen		Processors		Consumers	
Education	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age
No education	9	75.0	-	-	-	-	-	-
Primary	26	55.3	2	40.0	-	-	3	75.0
Secondary	43	60.6	9	56.3	-	-	11	45.8
College	19	86.4	2	66.7	2	66.7	6	26.1
University	1	100	0	0.0	0	0.0	5	38.5
Chi- value	15.08		2.78		3.733		27.107	
P-value	0.057		0.426		0.155		0.001*	
Age (Years)	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age
Below 20 years	3	75.0	-	-	-	-	2	25.0
21 – 29	8	50.0	5	55.6	0	0.0	9	34.6
30 – 39	26	61.9	7	63.5	4	80.0	5	35.7
40 – 49	26	68.4	2	40.0	1	100	6	54.5
Over 50 years	38	67.9	0	0.0	-	-	3	50.0
Chi- value	6.682		3.09		3.080		6.89	
P-value	0.571		0.377		0.214		0.548	

*indicate a significant difference at 95 % CI of the factors

The analysis on Table 4.8 above on the market information with the consumers' education levels was significantly different ($\chi^2 = 27.107$, $P = 0.001$). The findings show that the age and educational level play an important role in attaining the efficiency of macadamia

Table 4.4: Distribution of road network in the five counties

Farmers		Middlemen		Processors		Retailers	
F	%	F	%	F	%	F	%
29	17.9	11	39.3	4	59.1	5	16.7
50	30.9	15	53.6	3	42.9	1	3.3
29	17.9	2	2.7	0	0	21	70
54	33.3	0	0	0	0	0	0
162	100	28	100	7	100	30	100

Source : survey data 2012

Horticultural products are highly perishable and require fast transportation to market outlets. The findings from the study showed that the road network, which all macadamia traders rely on, was not in fair state. 30.9% famers, 53.6% of middlemen, while 42.9% of processors use dry weather roads which are impassable during rainy season. This may result in heavy losses due to delay in delivery of produce in time which may affect quality of the produce due to poor handling

4.2.0. Market Concentration

This study also aimed at establishing the concentration of market centres of macadamia. The findings are as shown in table 4.5.

Table 4.5: Market concentration of processing centers in the counties

County	Traders	Number of Centres	Production (MT)	Macadamia Price	Selling Price
Embu	38	5	5058	70.00	88.30
Kirinyaga	57	7	14000	52.86	63.60
Kiambu	73	7	12948	72.86	96.70
Nyeri	60	7	10521	68.3	84.20
Muranga	49	6	8725	60.60	68.80
r – value			0.883	0.978	
P value			0.047	0.004	

Source: Field survey Data 2012 : Significant at 95% Confidence levels

Using a correlation analysis, the study sought to find out whether there was a relationship between macadamia production and the market centres in an area. The findings revealed that there was a significant relationship in the macadamia production to the number of market centres in a given county ($r = 0.883$, $P = 0.047$). This confirmed that a county having more marketing centres had more production. This could be seen in Kirinyaga and Kiambu counties. Similarly, there was a significantly relationship ($r = 0.978$, $P = 0.004$) in the number of centres to the macadamia prices in the counties as indicated by table 4.5.

4.3.0 Market Integration

This study advocated that the market location affects the value and price of macadamia products, hence the necessity of determining the location and concentration of macadamia traders, markets and factories, Market location was determined by existence of trading centres in the five counties namely Embu, Kirinyaga, Kiambu, Nyeri and Murang'a, while market concentration level was determined by the number of the traders in each county as indicated in table 4.6 in terms of the volumes of macadamia they handle, the distance between one market and another in the county, number of factories and number of markets in counties.

4.4.1 Feedback on Quality Control systems

Regarding feedback on quality, majority of the traders (68.3%) below. reported that they did not receive feedback from customers on quality of the product as indicated by table 4.6

Table 4.6: Traders' opinion feedback on quality control

	Farmers		Middlemen		Processors		Retailers		Total	
	F	%	F	%	F	%	F	%	F	%
Received	33	20.4	18	64.3	7	100	14	46.7	72	31.7
Did not receive	129	79.6	10	35.7	0	0	16	53.3	145	68.3
Total	162	100	28	100	7	100	30	100	227	100
Satisfaction of quality										
Yes	107	66	24	85.7	4	57.1	24	80	159	70
No	55	34	4	14.3	3	42.9	6	20	68	30
Total	162	100	28	100	7	100	30	100	227	100
r-value	Satisfaction vs feedback = 0.556									
P-value	Satisfaction vs feedback = 0.095									
Training on quality										
Necessary	135	83.3	27	92.9	7	100	-	-	169	85.8
Not necessary	27	16.7	1	7.1	0	0	-	-	28	14.2
Total	162	100	28	100	7	100			197	100
r-value	Training vs feedback = 0.615									
P-value	Training vs feedback = 0.105									

Significant at 95% Confidence levels

Considering relationship in the traders feedback to their satisfaction in quality, the result showed that there was no significant relationship ($r = 0.556$, $p = 0.095$). Similarly, there was no significant relationship in feedback and quality ($r = 0.615$, $p = 0.105$) as indicated by table 4.6 above. This implies that traders did not get adequate feedback on quality and satisfaction information to assist in making informed decisions of the markets.

4.4.2 Macadamia Sound Kernel Recovery in the Counties

Sound Kernel recovery level is taken as a measure of quality performance in the market quality system. This falls after analysing structures and conduct in the quality control systems. This shows the quality levels in the counties which is a measure of market efficiency of macadamia.

Table 4.7 Sound Kernel Recovery Variance Analysis

COUNTY	SALES VOLUME	HIGH PEAK SKR	OFF-PEAK SKR	AVERAGE SKR
Kiambu	12948	22.20	19.10	20.67
Murang'a	5028	22.70	19.30	21.00
Kirinyaga	14000	21.90	18.10	20.00
Nyeri	10521	22.70	18.00	20.35
Embu	5058	21.4	18.3	19.85
R	0.051		-0.287	
P	0.936		0.639	

Significant at 95% Confidence levels

It was established that average macadamia SKR varies from season to season. Table 4.7 shows average sound kernel recovery (SKR) as determined by Jungle Macs, one of the processors in the study area. The result shows that there was a significant difference in quality between the seasons and mean average and between the counties as shown in table 4.8 Controlling the quality of macadamia appeared to have been a big challenge for the producers as there was a big quality difference between seasons and from one county to another. This might have been due to the lack of set quality standards and/ or absence of a quality control system. The quality level inconsistency may be the cause of import ban by USA and Japan in late 1990s.

4.4.3 Pair-wise Correlation of Quality and price

The study also sought to determine whether pairs of intervening variables had any relationship with the others as shown in the table 4.8

Table 4.9: Pair wise correlation matrix of tested variables

	Sales vol./ Production	# market	# traders	Factories	Market conc./Density (Km)	Average SKR	Buyinice	Selling price	Margin (Ksh)	%margins
Production	1									
# market	0.937*	1								
#traders	0.963*	0.938*	1							
#factories	0.362	0.211	0.517	1						
Market conc.	0.051	0.050	0.203	0.034	1					
Average SKR	0.172	0.249	0.353	0.318	0.828*	1				
Buying price	0.369	0.200	0.153	0.414	0.023	0.092	1			
Selling price	0.211	0.090	0.014	0.542	0.068	0.015	0.971*	1		
Margin (Ksh)	0.115	0.063	0.169	0.610	0.181	0.153	0.848*	0.950*	1	
%Margin	0.131	0.142	0.246	0.662	0.278	0.267	0.738*	0.877*	0.982*	1

NB: * Indicate the correlation coefficient (r) significant at 95% Confidence levels

The study was further focused in finding out whether quality affected the farmer’s prices. To determine this, correlation model was used where prices were correlated with average SKR, table 4.8. Results indicated that there was little association between macadamia SKR and Buying price (r=0.092), Selling price (r= 0.015), Margin (r=0.153) and percentage margin (r=0.267). This suggests that quality was not one of good predictors of price level and market efficiency hence improving and stabilizing quality of the nuts would have very little direct impact on farmers as indicated by table 4.9 above.

4.5.0. Price and Efficiency of Macadamia Marketing Systems

The assessment of price as a measure of market efficiency may require systematic analysis of price structure and conduct which may finally be measured by performance on price transmission.

4.5.1 Price Change of Macadamia Products

The price of a product is an important variable in establishing the efficiency of macadamia marketing system in Kenya. This study contends that the price of macadamia products determines their performance demand in the market compared to other nuts. To this end, the study sought to investigate how fast price changes to affect demand of macadamia products in

Table 4.9: Price Transmission matrix ratios between *Market pairs and seasons*

County Mkt	Season	Price Transmission Between 2 Mkt Pairs by Ratio of % change						
		Average Price per season	% change	Embu	Kirinyaga	Kiambu	Nyeri	Muranga
Embu	1**	64.60	9.30	1				
	2**	70.60	9.30	1				
Kirinyaga	1	58.30	13.60	1.11	1			
	2	66.20	13.60	0.94	1			
Kiambu	1	60.70	18.30	0.94	1.04	1		
	2	71.80	18.30	1.02	1.08	1		
Nyeri	1	64.50	5.90	0.94	1.11	1.06	1	
	2	68.30	5.90	0.97	1.03	0.95	1	
Muranga	1	58.00	13.80	0.90	1.00	0.96	0.90	1
	2	66.00	13.80	0.93	1.00	0.92	0.97	1

Price Transmission Between 2 Mkt Pairs by Ratio of % change of farmers

This study sought to assess the macadamia market integration level which was determined by price spread and harmonized price patterns across the market canters. When average farm selling prices per kilogram of macadamia for the year 2012 were compared across the five counties, the result indicated wide variation between the markets which reflected dissonance. The assessment revealed that the level of transmission of the macadamia prices between the counties was relatively high as indicated in table 4.9. These results indicated a relatively integrated market system. The results indicated that there were large variances in price between market pairs especially between Kiambu and Murang'a, and Kiambu and Kirinyaga as indicated by tables 4.9

Table 4.10: Average Market price and percentage margins Per Kilogram

County	Buying price	Selling price	Margins Kshs	Margin %
Kiambu	72.86	96.70	23.84	32.72
Embu	70.00	88.30	18.30	26.14
Nyeri	68.30	84.20	15.90	23.28
Kirinyaga	52.86	63.60	10.74	20.03
Muranga	60.60	68.80	8.20	13.53

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Pearson Correlation $r = 0.348$ $r = 0.848$
 $p = 0.566$ $p = 0.070$

Significant at 95% Confidence levels

There was a weak non significant correlation ($r=0.348$, $p=0.566$) between average buying price per county and average selling price as indicated on Table 4.12 above. This suggests that the buying price may have not singly influenced the selling price of macadamia, though it may have been one of the factors considered.

4.7. REGRESSION ANALYSIS OF THE VARIABLES

As per the SPSS generated coefficient table 4.12 the equation

($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$) becomes:

$$Y = 2.818 + 0.078 X_1 + 0.145 X_2 + 0.004 X_3 - 0.035 X_4 + 0.241 X_5$$

Where Y is the dependent variable i.e. procurement performance, X1 is market concentration and integration, X2 is level of quality control standards and specifications, X3 is pricing policy and price spread, X4 is organization structure management and X5 is market margin level

Table 4.12: Coefficient of determination

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.818	.313		9.000	.000
	Market Concentration and Integration	.078	.063	.074	1.238	.021
	Level of quality control standards and specifications	.145	.085	.103	1.707	.008
	Pricing policy and price spread	.004	.074	.004	.058	.043
	Organisational structure management	-.035	.078	-.026	-.441	.660
	Market Margin levels	.241	.073	.192	3.287	.001

The possible value of Y when all independent variables are equal to zero is 2.818. The data findings analyzed showed that taking all other independent variables at zero, a unit increase in market concentration and integration will lead to a 0.078 increase in efficiency of agrifood marketing system in Kenya; the p value is $0.021 < 0.05$, this means that there is a significant relationship between market concentration and integration and efficiency of agrifood marketing system in Kenya. A unit increase Level of quality control standards and specifications will lead to a 0.145 increase in efficiency of agrifood marketing system in Kenya; the p value is $0.008 < 0.05$, this means there is a significant relationship between Level of quality control standards and specifications and efficiency of agrifood marketing system in Kenya. A unit increase in Pricing policy and price spread will lead to a 0.004 increase in efficiency of agrifood marketing system in Kenya; the p value is $0.043 < 0.05$, this means that there is a significant relationship between pricing policy and price spread and efficiency of agrifood marketing system in Kenya. A unit increase in organisational structure management will lead to a 0.035 decrease in efficiency of agrifood marketing system in Kenya; the p value is $0.660 > 0.05$ which means the relationship between organisational structure management and efficiency of agrifood marketing system in

Kenya is not significant. Lastly, A unit increase in market margin levels will lead to a 0.241 increase in efficiency of agrifood marketing system in Kenya; the p value there is a significant relationship between market margin levels and price spread and efficiency of agrifood marketing system in Kenya. This infers that a market margin level is the most significant variable because it influences the efficiency of agrifood marketing system in Kenya most.

V. DISCUSSION OF THE FINDINGS

This chapter presents a summary of the study's major findings under the following sub-headings: market infrastructure and organizational structures; market barriers; market specifications; pricing policy and price transmission; margin analysis; market organizational conduct, index of macadamia marketing efficiency and performance indicators as forms of measuring macadamia marketing efficiency.

5.0. Market Performance

The ratio of the total value of the goods marketed to the marketing cost was used (purchasing cost/selling price) as a measure of marketing efficiency. The method used eliminated the problem of measurement of value added. The marketing efficiency in the five counties was carried out using Shepherd's index formula (1965). Three marketing outlets namely middleman, processor and distributor/retailer were used as marketing channels. Purchasing and selling prices were assumed to include all the cost elements of marketing variables incurred in the respective market channels. The marketing efficiency index for the three channels in five counties is indicated in table 5.1 below.

Table 5.1: Macadamia Marketing Efficiency Index

Market Channel	Embu	Kirinyaga	Kiambu	Nyeri	Muranga	Composite index	
Farmer	1.09	1.14	1.18	1.06	1.38	1.17	3
Processor	1.23	1.16	1.29	1.20	1.10	1.20	2
Middleman	1.26	1.20	1.33	1.23	1.14	1.23	1
Retailers	1.11	1.14	1.25	1.11	1.17	1.16	4
Composite	1.17	1.16	1.26	1.15	1.20	1.19	
Index ranked	3	5	1	4	2	*	

***Ranked 1 to 5 as most efficient in that order.**

The results indicate that middleman market channel is the most efficient followed by processor farmer and retailer in that order. For the counties which means Kiambu was most efficient while Nyeri had the lowest efficient marketing system as indicated in table 5.1. The method used eliminates the problem of measurement of value added. An increase of a ratio in any of the channel or county represents an improvement of market efficiency and a decrease in the ratio denotes reduced market efficiency.

5.1. Performance Indicators of Measuring Macadamia Marketing Efficiency

To assess efficiency, various indicators were analyzed which included:

Marketing costs, Margins of the four marketing level channels, Deviations of prices in counties and seasons, Peak period and seasonal prices and feedback and feed forward of information.

5.2. Measures to Increase the Market Efficiency

To increase market efficiency various multi-factor variables were analysed and only a few were highlighted. This included; government barriers, market Standardization and standard weights, transportation system, consumer interest, accurate market information and the number of competitors in each market channel.

5.3. Dimension of value chain analysis and market efficiency measures

Four main market efficiency measures were used to analyse the market chain:

- 1) Operational market efficiency which involved SCP, management organisational structure and market integration.
- 2) Technical marketing efficiency involved analysis of quality control systems in the chain analysis where sound kernel recovery levels were analysed.
- 3) Price efficiency, correlation coefficient and regression analysis were used to analyse the efficiency.
- 4) Financial marketing efficiency involved analysing of margins and market index for the counties and the four market channels.

VI. CONCLUSION AND RECOMMENDATIONS

Using pair-wise correlation analysis it was found that each of the identified independent variable impact on efficiency of macadamia marketing system in Kenya in different ways .All the marketing efficiency measures were clearly associated with the four objectives of the study and they were all dependent to each other. However, of great concern was management organizational structure which has correlation coefficient of 0.660 which is not statistically significant unlike the other 4 independent variables identified.From the results of marketing systems analysis, the macadamia marketing systems would be concluded to be inefficient because the industry is not able to offer macadamia products competitively in both domestic and export market segments. This was demonstrated by the dropping of Kenya export market from 2nd to 5th position in world (GAIN, 2009).Locally macadamia consumption is 1% compared to 10% of cashew nuts whose prices are almost at par, and further the share of domestic market of macadamia is only 15% compared to 54% of coconut which is further sign of inefficiency.

6.0. Recommendations

This study posits that in order to manage price fluctuations in the market, there is need to enter into a fixed-price contract that often specifies delivery quantities and quality attributes for a specified time and space. On the basis of findings and conclusions of this study, the following recommendations are made to improve the efficiency in marketing of macadamia value chain.

6.1. Quality Control System

Based on the above conclusion made, this study is of the opinion that in order to guarantee quality in the macadamia value chain, there is need to develop quality assurance programs, tailored to serve all stakeholders in the macadamia industry to assure and certify the attributes of a product, through normative documentation covering its production and processing. These programs include inspection procedures ensuring implementation, while the overall process may result in a label or certification proving the conformance of the attributes to the relevant documents. Quality assurance programs can be either compulsory, legislating on the safety requisites of products; or voluntary, through third party certification on quality management, ethical concerns, certification of organic production and private certifications involving various quality, safety, ethical and environmental concerns. Complying with these certifications requirements common in macadamia importing countries like , European countries, USA, Japan and China will go a long way in enhancing efforts being made to capture new market openings, or often, just to remain in business. This study is of the view that in order to improve the quality of macadamia products there is need to:

- Train farmers on the need to observe hygienic procedures in the harvesting of macadamia nuts, allow for maturity of the nuts and use appropriate drying methods.
- The government should establish a body that is charged with the responsibility of maintaining the accepted quality standards for macadamia.
- Encourage public-private partnerships on the training and promotion of quality standards for macadamia products.

6.2.0. Formation of Efficient and Operational Farmer's Organizations

Farmers to be organised to form companies which would own factories and have professional managers run them as their agents/employees which would reduce the chain to three levels (farmer/factory, auction broker and consumer) from current five (farmer, middleman, processor, retailer and consumer levels. Brokers would be appointed as agents of famers to sell dried nuts to both local and international buyers. They can also buy as appointed agents for global buyers in auction room .The premises of having auction room is to increase the value chain by improving efficiency. The system of auction is currently applicable in tea industry and also in coffee at Mombasa and Nairobi respectively, both in Kenya.

6.2.1. Removal of Trade Barriers

Trade barriers are measures that governments or public authorities introduce to make imported goods or services less competitive than locally produced goods and services. Barriers are also created by imposing ban of export by the Government which have impacted on market efficiency. All these barriers are recommended to be removed to improve efficiency of macadamia marketing system .Ban of export of raw nuts was imposed from 2008.

6.3.0. Policy Recommendations

The government should prioritize management organizational structures and construction of market centers for macadamia in areas where they are produced .Establishing an independent body that is directly charged with maintaining the quality standards and specification of macadamia products for both local and export markets is

necessary. The government should encourage public companies and private company's partnerships with institutions of higher learning on the training and promotion of quality standards for macadamia products. To meet this challenge, Quality Control Circles are recommended to be introduced in the macadamia industry. This method has done well in Japan, Europe, and USA (Amrik and Keith, 1988)

6.4.0 Suggestions for Further Studies

A comparative study on the efficiency of agifood marketing system in Kenya and other agricultural food producing countries such as South Africa, China, USA and Australia may be conducted to establish points of confluence and divergence, and in the process, suggest ways of improving macadamia marketing structures in Kenya. A future research should address the problem. Introduction of research of quality management circles in institutions of higher learning is recommended. Quality circles bring in together small groups of between 5 to 15 management staff and the workforce who meet regularly to find solution.

Some advanced predictions of contract theory and transaction cost economic hypothesized and empirically tested by an overall survey in Kenya macadamia sub sector to assist in pricing and market efficiency.

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