



RELATIONSHIP BETWEEN MAIZE MARKETING STRATEGIES AND MAIZE YIELD IN THE WESTERN REGION OF KENYA

Adijah M. Ali-Olubandwa

Department of Applied Community Development Studies, Egerton University, Kenya.

ABSTRACT

The introduction of Structural Adjustment Programme (SAPs) and trade liberalization resulted in agricultural reforms in Kenya and other developing countries. Hence the Kenya government no longer gives incentives to small scale farmers. Therefore, the small scale farmers, extension service and the government at large have to look for all ways to increase maize production in the country, including using marketing strategies that would lead to high incomes for the small scale farmers hence the study. Men and women both make significant contributions in maize-based farming systems and livelihoods, although gender roles in maize cultivation vary greatly across and within regions. Their contribution to agricultural work varies even more widely, depending on the specific crop and activity. The purpose of the study was to establish the relationship between maize marketing strategies used by small scale farmers in the study counties and maize yield in the Agricultural Reform Era: The Case of Western Region of Kenya. This is because maize is the main staple for most of the Kenyan population and Western Region is the food basket, hence most of the small scale farmers livelihood in the western region of Kenya is dependent on maize production and marketing. The Structural Adjustment Programmes put constraints on input acquisition and opened up the maize market while leaving the small scale farmers farmer to fend for themselves. The study used Ex-post facto research design via cross sectional survey. Busia, Bungoma, Mt. Elgon and Lugari Counties were purposively selected to represent the Western Region of Kenya. Two sub-counties from each of the four Counties were selected by simple random sampling. For uniformity purposes 200 small scale farmers were selected from focal areas through systematic random sampling hence ensuring that they all had been exposed to extension staff. Four key informants were sampled purposefully based on their positions of authority. In addition, 52 extension staffs were sampled through systematic random sampling. The small scale farmers were interviewed with the help of interview schedule containing open and closed ended questions. Data were analyzed using descriptive and inferential statistics. Simple linear regression of the marketing strategies and maize yield illustrated a statistically significant relationship with adjusted $R^2 = 0.281$, $F = 11.931$ at $p < 0.0005$. Hence, the null hypothesis "There is no statistically significant relationship between Maize Marketing Strategies and Maize Yield in the Western Region of Kenya" was rejected. The study recommended that the extension staff should teach the small scale farmers on the changes that have been brought about by Structural Adjustment Programme and market liberalization and how to take advantage of such opportunities such as form strong common interest groups. Research should develop innovations that would result in high maize yield at low farming costs.

KEYWORDS: liberalization, maize yield, farmers, agricultural reforms, food price instability

INTRODUCTION

Maize marketing and trade policy in Kenya has been dominated by two major challenges. The first challenge concerns the classic food price dilemma: how to keep farm prices high enough to provide production intensification incentives for farmers while at the same time keeping them low enough to ensure poor consumers' access to food. The second major challenge has been how to effectively deal with food price instability, which is frequently identified as a major impediment to smallholder productivity growth and food

security (Mbithe, Mwabu and Awiti 2017). Moreover, price transmission analysis finds that about 30 per cent of the changes in world market prices are transmitted to domestic markets in Kenya (Jonathan Makau Nzuma, 2013).

Since independence the government of Kenya has placed great emphasis on agricultural production. The government aimed at improving productivity of small scale farms through incentives such as agricultural credit, extension service, and provision of training, improved input supply and improved markets, GOK (2010, 2013). In addition annual price reviews

are carried out whose results are meant to assist farmers to meet the increasing cost of agricultural inputs.

Furthermore, statutory marketing boards were set up to purchase, store and sell agricultural produce in order to smooth out price fluctuations and stabilize prices to the advantage of both consumers and producers, Karigi [4]. With the introduction of SAPs (Structural Adjustment Programme) and trade liberalization which resulted in agricultural reforms in Kenya and other developing countries, the Kenyan government no longer gives most of these incentives to small scale farmers. Though the government of Kenya has put in place crops act whose objective is to accelerate the growth and development of agriculture in general, enhance productivity and incomes of farmers and the rural population, improve investment climate and efficiency of agribusiness and develop agricultural crops as export crops that will augment the foreign exchange earnings of the country, through promotion of the production, processing, marketing, and distribution of crops in suitable areas of the country (Republic of Kenya), [5] the reforms remain. In fact since 1990 the government has undertaken considerable macro and sectoral policy and institutional reform measures. These measures include the removal of foreign exchange controls, liberalization of interest rates, decontrol of petroleum and agricultural commodity prices, liberalization of imports and exports, rationalization of tariffs, and civil service and parastatal reforms (MARD (Ministry of Agriculture and Rural Development), [6]. Though these reforms were meant to level the play field to the advantage of small scale farmers, they

resulted in high production costs among small scale farmers due to high costs of inputs especially fertilizers. In addition, there are poor and long marketing chains, low levels of mechanization and high transport costs (Republic of Kenya), [7]. These changes may have affected the maize production among small scale farmers. In fact currently maize production in Kenya is below the country's consumption requirements (Republic of Kenya) [7,8].

PURPOSE OF THE STUDY

The study objective was therefore to look at the impact of Reform measures on maize production among small scale farmers in Western Province of Kenya. Comparison of how the farmers in the different Counties viewed these reforms were also considered.

METHODOLOGY

Ex-post facto research design was used via a cross sectional survey. This was because the study used naturally occurring treatments on subjects having a self-selected level of the independent variable (Kathuri & Pals, 1993; Borg & Gall, 1993).

The study was conducted in Western Region which is administratively divided into six counties as shown on Fig. 1 & 2. The region is made up of Busia, Bungoma, Kakamega, Lugari: Vihiga and Mt. Elgon counties. The Region covers an area of 8436 Km² out of this 6670 Km² has potential for agriculture of which, 3591 Km² is cultivated for various crops. Rainfall is bimodal. The long and short rains come in March-May and August-November periods, respectively. Annual rainfall ranges from 900mm in Busia to 2100mm in Bungoma (MARD, 2002).

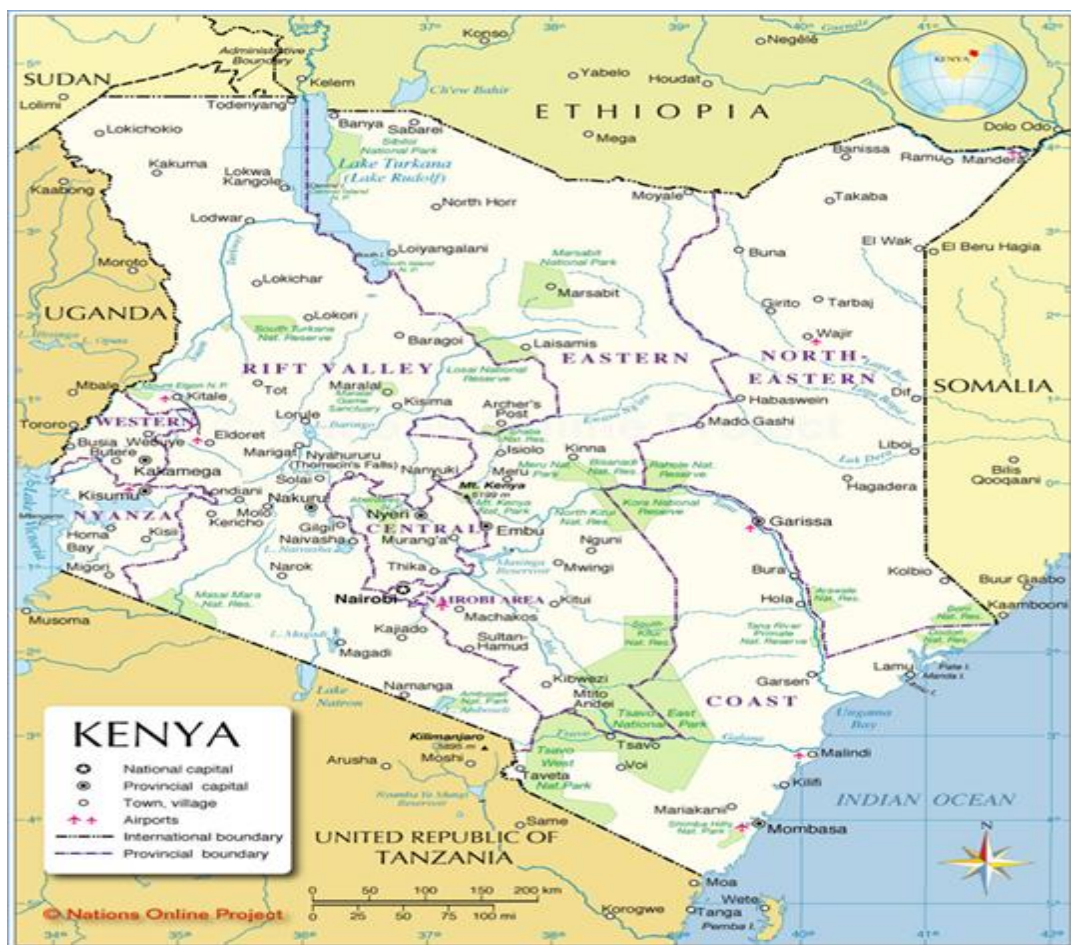


Fig. 1. Map showing the Western Region of Kenya

The target population was made up of small scale farmers in the Western Region. The Western Region is made up of Lugari County, Bungoma County, Mt. Elgon County, Busia County, Vihiga County and Kakamega County. Busia,

Bungoma, Mt. Elgon and Lugari counties were selected through purposive sampling because Busia County had the lowest average maize yields. The accessible population is as shown on Table 1.

Table 1. Showing the accessible population

County	Accessible population
Lugari County	41,809
Bungoma County	158,370
Mt. Elgon County	19,746
Busia County	136,736

Busia, Bungoma, Mt. Elgon and Lugari counties were selected through purposive sampling because Busia County had the lowest average maize yields (7 bags per acre) in the region while, Lugari County experienced the highest average maize yield (18 bags per acre). Bungoma and Mt. Elgon counties were in-between in terms of maize yield (Central Bureau of Statistics, 2001; Ministry of Agriculture, 2006). The four counties also represented Western Region in terms of all the Agro-ecological zones that exist in the Region and therefore, results obtained could be generalized to the whole Region.

Two sub-counties from each of the four selected counties were selected by simple random sampling. The study sub-counties were Bumula and Webuye in Bungoma County; Kaptama and Kapsokwony in Mt. Elgon County; Funyula and Butula in Busia County and Lugari and Likuyani in Lugari County.

For uniformity purposes the small holder farmers were selected from focal areas through systematic random sampling thus ensuring that they all had been exposed to extension staff. At the time of data collection, the extension staff had trained the farmers in one focal area per division and had moved to the next. The focal area approach which is under the National Agriculture and Livestock Extension Programme (NALEP) aims at improving livelihoods of the poor rural households (MOA & ML&FD, 2006). In the focal area approach the extension staffs works in one area of approximately 400 farmers per year. The focal area is taken as a demonstration site where farmers from the rest of the division can learn latest technologies (Baiya, 2003). The key informants were purposefully sampled due to their positions of authority.

Table 2. Total number of subjects by category from which the sample was drawn

Category	Number of subjects	Sample size
Extension staff in the Region	832	52
Household heads in Busia County	136,736	50
Household heads in Lugari County	41809	50
Household heads in Bungoma County	158370	50
Household heads in Mt. Elgon County	19746	50
Key Informants		4
Total	357,493	256

The study sought to determine Relationship between Maize Marketing Strategies and Maize Yield in the Western Region of Kenya

RESULTS AND DISCUSSIONS

The study sought to establish whether there was any relationship between maize marketing strategies used by farmers in the study counties and maize yield. These included: where farmers sold their maize (National Cereals and Produce Board, middlemen and local market) how they decided on the

The sample size was arrived at using the following formula:

$$n = NC^2 \div C^2 + (N-1)e^2$$

(note: n=sample size; N=population size; C=Coefficient of variation which is 30%; e=margin of error which is fixed between 2-5%). The study sample was calculated at 25% coefficient of variation and 5% margin of error (Nassiuma, 2000).

For the purpose of generalizing the results to Western Region, twenty five percent coefficient of variation was used to ensure that the sample was wide enough. Five percent margin of error was used because the study was an ex-post facto survey. In ex-post facto survey the independent variables are not be manipulated hence necessitating relatively higher margin of error. The study sample is shown in Table 2.

The small scale farmers and extension staff were selected through systematic random sampling from sampling frames that were obtained from the extension staff offices. Four key informants were interviewed in order to generate additional information and clarify issues on the reform measures that had taken place. The key informants included the Provincial Director of Agriculture and Livestock Extension, the Provincial Crops Officer, an officer in position of authority in Agricultural Finance Corporation and an officer in position of authority at the National Cereals and Produce Board, Western Region. The small scale farmers were interviewed with the help of interview schedules and the extension staff were asked to fill questionnaires

price at which to sell their maize and how they solved marketing problems.

The results revealed that 60.9% of the respondents sold their maize. Further analysis by County revealed that 31%, 95%, 86.2% and 30.5% of respondents from Bungoma, Lugari, Mt. Elgon and Busia Counties, respectively, sold the maize that they produced. Simple linear regression of the marketing strategies and maize yield illustrated a statistically significant relationship with adjusted $R^2 = 0.281$, $F = 11.931$ at $p < 0.0005$. Hence, the null hypothesis was rejected.

Stepwise linear regression was used to determine the independent variables with the strongest relationship to maize yield. The independent variables included in the analysis were as follows: sell maize to the National Cereals and Produce Board, sell maize to middlemen, neighbours to determine maize prices, use National Cereals sell maize in the local market, use and Produce Board prices to determine maize prices, solution to market problems and solution to problems of low prices. Only three independent variables that is, sell maize to the National cereals and Produce Board, sell maize to the middlemen and use neighbours to determine the price at which to sell maize were entered in the analysis. The F value was 55.139 and $p < 0.01$ with adjusted $R^2 = 0.195$.

This suggests that the independent variables: sell maize to National Cereals and Produce Board, sell maize to middlemen and use of neighbours to determine maize prices contributed to about 19.5% of the relationship between marketing strategies and maize yield. The independent variable that contributed most to the variance in maize production was "sell maize to the National Cereals and Produce Board" with a t value of 7.952 and Beta of 0.455 as shown in Table 3. This means that the farmers who sold their maize to the National Cereals and Produce Board realised higher yields.

Table 3: Coefficients for Marketing Strategies Included in the Analysis

	Understandardised		Standardised			Collinearity	
	Coefficients		Coefficients			Statistics	
	B	Std Error	Beta	t	Sig.	Tolerance	VIF
Constant	3.013	0.113		26.740	0.000		
Sell of maize through the NCPB	1.724	0.217	0.455	7.952	0.000	0.999	1.001
Sell of maize through to Middlemen	0.867	0.187	0.278	4.631	0.000	0.906	1.104
Use neighbours to Determine maize prices	-1.285	0.416	-0.186	-3.091	0.002	0.906	1.103

The relationship between "sell maize through the NCPB" and "sell maize to middlemen" and Maize yield was positive (as shown in the equation), implying that those respondents who sold their maize to either the NCPB or to middlemen experienced higher yields. On the contrary, the results revealed that there was a negative relationship between the respondents who used neighbours advice to determine maize prices and maize yield.

The high yield realised could be because the farmers looked at the board as a risk management market. Farmers transfer the market risks which they are not able to shoulder to the board and therefore, the farmers have more certainty about the prices that they will receive and are encouraged to produce more (Kinyua, 2004).

Collinearity diagnostic results illustrated that, the tolerance levels for the independent variables with the strongest relationship to maize yield, were quite high and VIF low as seen in Table 3. The results also revealed high tolerance values and low VIF for all the other independent variables, implying that there was no possibility of multicollinearity. The nature of the relationship between maize yield and the strategies for marketing maize can be presented by the linear equation below.

Maize yield = $3.013 + 1.724$ (sell of maize through the NCPB) $+ 0.867$ (sell of maize through middlemen) $- 1.285$ (use of neighbours to determine maize prices).

Maize yield can therefore, be predicted using the equation.

This could be because farmers who asked advice from neighbours sold their maize at the farm gate and in the local market, since they realised low yields which were uneconomical to transport to distant markets.

The study further sought to determine the markets preferred by respondents in the different study Counties. The results revealed that most of the respondents from Lugari and Mt. Elgon sold their maize to middlemen and the NCPB. On the other hand, respondents in Bungoma and Busia Counties said that they sold their maize locally to neighbours and the local market as seen in Table 4.

Table 4: Percentage of Where Farmers in the study Counties Sold Their Maize

	BUNGOMA	LUGARI	Mt ELGON	BUSIA
Where do you sell your maize?				
Middlemen	0	63.3	75.9	0
Cereals and produce board	0	35.0	2.70	0
Locally	34.5	8.4	17.2	27.6
Did not sell maize	65.5	0.00	4.2	72.4

Generally, more respondents sold maize to middlemen as compared to the National Cereals and Produce Board. This is because the board was no longer providing ready market to the farmers. According to a key informant in the board, the board bought large quantities of maize from the farmers when the Government saw the need to do so. This may be when the farmers were being exploited by middlemen, the Government may come in to stabilise prices, or in case there was risk of food shortage in the country the Government may buy more

maize from the farmers as a strategic reserve. The key informant from the NCPB attributed the high percentage of farmers from Lugari County selling maize to the National Cereals and Produce Board as compared to the other Counties, to the fact that there were more buying centres in Lugari County and two go downs. In addition, since Lugari County is close to Eldoret, the farmers also had access to the go downs at Eldoret.

Unstable prices and low prices were the main problems experienced in marketing of maize experienced as was by

cited by the respondents. The problem of low market prices was 29.4% of the respondents. This problem was experienced by 10.1%, 43.5%, 34.8% and 11.6% of respondents from Bungoma, Lugari, Mt. Elgon and Busia Counties, respectively. Though more respondents from Lugari and Mt. Elgon Counties cited the problem of low prices, a higher percentage (75%, 51.8%) of respondents from Lugari and Mt. Elgon Counties, respectively, claimed that they sold their maize at a profit (Table 6). This could be because these farmers were commercial minded and were aware that the profit margin for their maize could be even higher than what they were currently getting.

The percentage of respondents experiencing market price problems in Busia County was low, probably because very few respondents sold maize and therefore, most of the respondents had not experienced the problems. In addition, 13.3% of the respondents experienced problems with unstable prices, of these 3.3% were from Bungoma County, 16.1% from Busia and Lugari Counties and 64.5% from Mt Elgon County. When farmers receive prices that are unstable and uncertain, they run price risks from the moment they decide to plant a crop and every time they use paid labour or buy and apply farm inputs. They never know for sure whether the price that they receive at the end would cover their costs and be worth their efforts, hence, they are discouraged to produce

Few respondents from Bungoma County experienced problems with fluctuations in market prices. This could be because SACRED-Africa (a non-governmental organisation which leads an alliance of Non -Governmental Organizations that conduct farm research) has encouraged farmers to form groups (cereal banks) through which they sell their maize. Cereal banks are buying centres which are situated as close as possible to the farmers, to which farmers are encouraged to sell all their maize irrespective of the amount. In cereal banking, farmers form their own marketing associations to inspect, bulk, store and sell maize. This approach allows them to sell maize for top prices to larger scale buyers and also to take greater control over their local food supply and sell small quantities for reasonable prices during grain shortages (Woomer & Mukhwana, 2004).

Table 5: Solutions Taken by Farmers to Solve Marketing Problems

	BUNGOMA (%)	LUGARI (%)	Mt. ELGON (%)	BUSIA (%)
n	58	60	58	59
solution to marketing problems				
nothing	12.1	50.8	14.3	1.8
Stock maize & sell when prices are high	3.4	8.5	46.4	3.6
sell locally/ in small quantities	12.1	6.7	7.0	12.5
Use own measuring container	1.7	0.0	1.7	0.0
Alternative marketing	0.0	3.3	7.1	0.0
Negotiate	0.0	0.0	12.5	1.8
N/A	40.7	30.7	11.0	70.3

Generally, the results revealed that respondents from Mt. Elgon had better ways of dealing with maize marketing problems than the other Counties. Relatively more farmers (46.4%, 7.1% and 1.7 %) stocked their maize and sold when the prices were higher, looked for alternative market, and used their own containers to avoid being exploited by middlemen, respectively. Furthermore, relatively more (12.5 %) farmers in Mt. Elgon County negotiated for higher prices

The farmers also cited exploitation from middlemen and delayed payments by the National Cereals and Produce Board as problems facing them in marketing of maize. The marketing chain consists of multiple middlemen, each taking a margin at every stage of the chain, and price variations in space and time are often large and erratic. There is need for farmers to be protected from exploitation from middlemen. This can be done by encouraging farmers to form strong farmer groups, which can fight for them.

The respondents were asked how they solved problems related to marketing. The responses were as shown in Table 5. It is interesting to note that though Lugari County experienced high maize yields and had more respondents with problems of low market prices, a high percentage (50.8) of the respondents did nothing about the problems they faced in maize marketing. This could be because they did not know what to do. The extension staff in Lugari County needed to teach farmers on the different channels through which they could sell their maize rather than just relying on the NCPB. The farmers should also be encouraged to form groups to market their maize.

On the contrary, high percentages (46.4 %) of respondents from Mt. Elgon stocked their maize until the market prices improve as shown in Table 5. Farmers from other Counties may have shied away from stocking maize in fear of increased risks. This is supported by Nyoro et al (1999) who suggested that traders and farmers avoid stocking huge stocks due to the price volatility, extra expenses on post-harvest management and risk of declining grain quality. Risks caused by price instability could be a barrier in maize marketing, in that while a farmer may be waiting for higher prices, maize may flood the market from other producers locally or from neighbouring countries, hence, resulting in lower prices. Woomer & Mukhwana, (2004) further asserted that poor grain quality, difficulties and risks of grain storage and overly complex marketing chains combine to result in the low prices received by many farmers in Western Province.

when they thought that they were being exploited. Perhaps this is the reason why a higher percentage of respondents from Mt. Elgon County (51.8 %) reported that they sold their maize at a profit as shown in Table 5.

Although a high percentage of farmers from Lugari County reported that they did nothing about the marketing problems facing them, most of the respondents (75%) claimed that they sold their maize at a profit. This could be because

most of the respondents from Lugari County (98.3%) sold their maize either to middlemen or to the National Cereals and Produce Board as compared to 0% from Busia and Bungoma Counties (Table 4).

A cross tabulation of the respondents who sold their maize at a profit against maize yield was carried out. The results revealed that 28.6 % of farmers who sold their maize

at a profit realised maize yield of over 16 bags per acre as compared to 18.8% of the respondents who did not sell their maize at a profit. The respondents who did not sell their maize at a profit said that, it was because the market price was lower than the cost of production. A correlation profit", revealed a statistically significant between maize yield and "sell maize at relationship ($R^2=0.169$ and $p < 0.01$).

Table 6: Distribution of Respondents who sell Maize at a Profit (N=235)

	BUNGOMA (%)	LUGARI (%)	Mt. ELGON (%)	BUSIA (%)
n	58	60	58	56
Do you sell the maize that you produce at a profit				
YES	8.6	75	51.8	11.9
NO	91.4	25	48.2	88.1

When asked about the quality of infrastructure (roads, telephone services and electricity) about half (48.3%) of the respondents from Mt. Elgon said that it was good and 51.7% said that it was bad. A higher percentage of respondents from Busia County (70.7%) said that it good, while 93.3% and 70.7% from Lugari and Bungoma Counties, respectively, said that it was bad. Most of the respondents who said that the infrastructure was bad reported that it was due to poor roads. The respondents from Busia County may not have experienced much problem with infrastructure because they did not transport their maize in bulk to distant markets. Furthermore, few farmers sold their maize and the maize was sold to neighbours and the local markets. This implies that for maize production to increase in Western Province farmers have to be provided with market information, training on marketing skills and infrastructure improved so that farmers can sell their maize at higher profits.

Good infrastructure is important for marketing of agricultural products. Poor roads result in high transport costs between the surplus and deficit areas, hence lower farm gate prices. The farm gate prices may be lowered because if transport costs are high, farmers may shy away from transporting their maize to distant markets, which may be maize deficient. As a result, most farmers may sell their maize at the farm gate causing maize supply to be much higher than demand, hence lowering the farm gate prices. High transport costs also increase farm gate input prices and thus increase the production costs.

RECOMMENDATION

The infrastructure especially roads in Western Province needs to be improved especially in Lugari and Mt. Elgon Counties. This is because these are potential food baskets for the Country, and improvement of infrastructure in these areas would result in better food distribution in the country and would also lower production costs for farmers. It is, however, important to point out that improvement of roads and the general infrastructure alone will not improve maize production. Farmers need to form groups to help them solve their marketing problems. The willingness of farmers to form groups and scout for better markets is influenced to some extent by their attitude.

REFERENCES

1. Baiya F. M. (2003). *Focal area extension planning: National agriculture and livestock extension programme field guide notes*. Nairobi, Kenya, Government Printers.
2. Borg, WR, Gall, MD. (1993) *Education research: An introduction*. New York: Longman Inc; 1993.
3. Central Bureau of Statistics (2001). *The 1999 population and housing census, Nairobi, Kenya: Government Printers*
4. Jonathan Makau Nzuma (2013) *The political economy of food price policy: The case of Kenya* UNU World Institute for Development Economics Research (UNU-WIDER) ISSN 1798-7237
5. Kathuri & Pals, Kathuri NJ, Pals, DA. (1993). *Introduction to educational research*. Njoro, Kenya: Educational Media Centre, Egerton University.
6. Karigi S. N. (1998). *External shocks and adjustment policies in the Kenyan economy. A computable general equilibrium analysis special reference to the agricultural sector*. PhD. Dissertation; 1998.
7. Mbithe Pauline, Germano Mwangi and Maurice Awiti (2017). *Impact of structural adjustment programs on agricultural sector growth in Kenya*. *Journal of agricultural policy* issn 2520-7458 (online) vol.2, issue 1, no.1, pp 1 - 33, 2017
8. Ministry of Agriculture (2006), *Western Province of Kenya annual report; 2006*.
9. Ministry of Agriculture and Rural Development (2002). *Department of Agriculture Western Province 2001 annual report;*
10. Nassiuma D. K. (2000). *Survey sampling: Theory and methods*. Njoro, Kenya: Egerton University Press; 2000.
11. Republic of Kenya. (2010). *Agricultural sector development strategy 2010-2020*. Nairobi, Kenya: Government Printers; 2010.
12. Republic of Kenya (2013a). *Crops act; Kenya Gazette Supplement*. Nairobi, Kenya: Government Printers; 2013.
13. Republic of Kenya (2013b). *Ministry of Agriculture Food Security Assessment Report*. Nairobi, Kenya: Government Printers; 2013.
14. Woomer PL, Mukhwana EJ. *Working with small holder farmers to improve maize production and marketing in Western Kenya*. *Uganda Journal of Agricultural Sciences*. 2004;9:491-500 ISSN 1026-0919.