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An Economic Analysis of the Major Obstacles to Optimal Exploitation of Kenya's Cut Flower Export Market

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CONTENT **PAGE**

List of tables

Declaration.....i

Acknowledgement.....ii

Dedication.....iii

Acronyms.....iv

Abstract.....v

CHAPTER ONE

1.10 INTRODUCTION.....1

1.20 STATEMENT OF THE PROBLEM.....5

1.30 RESEARCH QUESTION.....6

1.40 OBJECTIVES OF THE STUDY.....6

1.50 HYPOTHESES.....6

1.60 SIGNIFICANT OF THE STUDY.....7

CHAPTER TWO

2.10 LITERATURE REVIEW.....8

2.20 THEORETICAL LITERATURE.....8

2.30 EMPIRICAL LITERATURE.....12

2.40 LITERATURE OVERVIEW.....16

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EAST AFRICANA COLLECTION

CHAPTER THREE

3.10 METHODOLOGY.....17

3.11 MODEL SPECIFICATION AND ESTIMATION TECHNIQUES.....17

3.12 THE EXPORT MODEL.....19

3.13 HYPOTHESES TESTED.....20

3.14 ESTIMATION TECHNIQUE.....20

3.20 DATA SOURCE AND TYPE.....21

3.30 LIMITATION OF THE STUDY.....21

CHAPTER FOUR

4.10 ANALYSIS AND INTERPRETATION OF THE RESULTS.....22

4.11 INTRODUCTION.....22

4.12 REGRESSION ANALYSIS : ELASTICITIES OF CUT FLOWER EXPORT.....22

4.20 DIAGONISTIC TESTS CARRIED OUT 24

4.21 TEST FOR AUTO-CORRERATION.....24

4.22 TESTING FOR THE NORMALITY OF THE ERROR TERM.....25

4.23 TESTING FOR HETEROSKEDASTICITY.....25

4.24 CORRELATION ANALYSIS 26

4.25 THE EXPLANATORY POWER OF THE MODEL 26

4.30 EXPLANATORY VARIABLES.....27

4.31 REAL EXCHAGE RATE 27

4.32 AIRFREIGHT COST.....27

4.33 SEASONALITY 27

4.40 QUALITATIVE ANALYSIS 29

4.41 MARKET SHARE 29

4.42 TARIFF AND NON-TARIFF BARRIERS.....31

CHAPTER FIVE

5.10 SUMMARY AND POLICY RECOMMEDATION.....32

5.20 AREA FOR FURTHER STUDY.....33

REFERENCES.....34

APPENDIX I UNIT-ROOT TESTS.....37

II HETEROSKEDASTICITY.....41

DATA COLLECTED.....42

DECLARATION

This research paper is my original work and has not been presented for a degree to any other university.

CHOMBA THARAU S.

.....

25th Sept 2003

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This research paper has been submitted with our approval as university supervisors;

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DEDICATION

To my young ones;

Wathoni Jennifer, Njeeri Tabby and Chomba Jeff.

Life continuity belongs to the future generation.

ACRONYMS

GDP Gross Domestic Product

HCDA Horticultural Development Authority

TB Tariff Barriers

NTB Non- Tariff Barriers

VER Voluntary Export Restrains

RER Real Exchange Rate

EU European Union

GSP General System of Preference

LDC Less Developed Countries

UK United Kingdom

SPS Structure, Conduct and Performance

PAM Policy Analysis Matrix

NTXs Non- Traditional Exports

SSA Sub-Saharan Africa countries

AIRCo Airfreight Cost

SES Seasonality

FPEAK Fresh Produce Export Association

KFC Kenya Flower Council

CBIS Central Business Information Services

c.i.f Cost-insurance-freight

f.o.b Free-on-board

ABSTRACT

Horticultural produce export has recently improved both in volume and value. Among the fresh produce, cut flower have remained on top. Its' increase has been coupled with quality control, improved packaging and market diversification. This research paper attempts to analyse fluctuation of real exchange rate (RER), airfreight cost (AIRCo) and tariff (T) and non-tariff barriers (NTBs) as the main obstacles hindering full exploitation of cut flower export market.

Data collected was subjected to diagnostic test like test for stationarity. OLS regression test have later been done to estimate the elasticities of these obstacles against the dependent variable, cut flower export value (XPT) over a twelve-year period. RER and AIRCo are found to be statistically significant at 5% level. The dummy variable, seasonality is statistically significant at the first, third and fourth quarter. During the second quarter cut flower export is not statistically significant.

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CHAPTER ONE

"The competitive market in agriculture is not a story of the invisible hand alone, it's the story of a constant struggle between the invisible hand and the invisible foot." Colander D.C.

1.10 INTRODUCTION

Kenya, a developing country, relies primarily on agricultural sector for both employment and foreign exchange earnings. Labour, land and climatic factors are abundant in Kenya and contribute to growth and development of this sector. The sector plays a major role in overall economic development of the country contributing 24 per cent of the GDP in the year 2001, (Economic survey 2002). However, the sector's GDP share has been declining from 25.6% in 1974 to 24.1% in the year 2001. This has been attributed to unfavourable weather, fluctuation of commodity price, poor crop husbandry and infrastructure, (Development plan 2002 – 2008).

Most of the primary exports come from the agricultural sector, which includes tea, horticultural crops, coffee, pyrethrum, sugarcane, hides and textiles. The horticultural crops export is second only to tea. An area of 32,000ha is devoted to horticulture. Although only 2000 ha of this is used for cut flower production, the product leads other fresh produce in export earnings. For the last six years, the volume of cut-flower export increased by 34% (29,373 - 40,875 tons) where the percentage increase in value within the same period was 306.2% (Ksh. 3642 - Ksh. 14792 millions),(see table I). This significant increase was attributed to commodity value addition through improved packaging coupled with high volume of cut flower export, (Economic Survey 2002).

TABLE I

EXPORT VOLUME/VALUE FOR HOLTICULTURAL PRODUCE FROM KENYA1991-2002

YEAR	FRUITS		VEGETABLES		CUT FLOWER	
	VOLUME	VALUE	VOLUME	VALUE	VOLUME	VALUE
	Tons	MKsh	Tons	MKsh	Tons	MKsh
1992	11232	359	26324	910	19806	1248
1993	11697	489	26786	1700	23636	2483
1994	13079	536	26978	1797	25121	2637
1995	13865	617	32126	2205	29374	3642
1996	16869	769	32748	2577	35212	4356
1997	17450	805	30880	3116	35850	4888
1998	11350	819	36800	4052	30220	4857
1999	15595	1256	46377	5713	36992	7235
2000	15415	1098	45038	5293	38757	7166
2001	22595	1560	34771	8034	41396	10627
2002	———	———	———	———	52107	14792

SOURCE: HCDA

The role played by flexible exchange rate system, where market forces determines the exchange rate between the trading countries is also significant to the earning from the exported goods. The exchange rate system in Kenya has been changing from fixed to floating, Njuguna S.N, (2001). According to Alta, (1999), in an economy where exchange rate system is fixed, devaluation may bring the price of exports down. However, this may lead to increased price of the imports thus pushing up domestic inflation. It need be noted that choice of exchange rate be it fixed, floating or crawling system reflects priority objective of the exchange rate policy pursued.

There exist other factors that affect the export market. There are cases where importing country imposes either tariffs barriers (TBs) [1] or non-tariff (NTBs). The latter include import quota where a selected number of importers are licensed to import just a certain amount of goods. The most common of the NTBs is the Voluntary Export Restraints[2] (VER) . More so, importing government may impose procedural rules under Regulatory Trade Restrictions that limit imports. Some regulatory restrictions are imposed for legitimate reasons like health and sanitary measures. Others are designed simply to make importing more difficult like double inspection.

!. Taxes or customs duty on goods entering a country's borders in order to protect her domestic industry from unfair competition. Which would make her goods not sell in the own country.

2. This is where an importing country enters into agreement with the exporting country on the quantity to be imported.

Cut flower, a perishable good, will need proper storage and be moved very fast, via airfreight, to reach the consumer in proper condition. Storage at appropriate temperatures has to be ensured on board and at the port of exit. High quality of packaging material is required to ensure that stem and bud quality is maintained from the production stage (farm) to the consumption stage.

The study intends to specify the problem faced by Kenyan exporters, which hinders optimal exploitation of the cut-flower market for the last twelve years. Objectives, hypotheses and research questions will be set before reviewing of both theoretical and empirical literature on which theoretical framework will be based. Model specifications to achieve research objectives as well as answering the research questions will be formulated. Data source and type as well as assumptions to be made to necessitate the study will be discussed.

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1.20 STATEMENT OF THE PROBLEM

Horticultural export products faces NTBs like regulatory trade restrictions in meeting the high quality and safety standards in the international market. The European Union, the major importer of cut flower, has set tough protective measure to ensure quality and environmental control.

Exchange Rate Policies that typically involve devaluation of nominal exchange rate stimulates competitiveness of non-traditional exports (NTXs) like cut flower. This makes price of the product from the devaluing country cheaper in foreign market than those of the competitors. Kenya's nominal exchange rates have been changing from fixed to floating within the period under study (1991-2002). The real impact of this to cut flower's earned foreign exchange needs to be investigated.

Market infrastructure, like inadequate storage facilities and cargo space, has not been favorable for cut-flower exports. Airfreight charges keep on fluctuating and are higher during the peak period. This was analysed by Salasye, Ikiara and Nduati ten years ago, not as market infrastructure *per se* but as factors determining horticultural export. An economic analysis of these major obstacles to optimal exploitation of Kenya's cut flower export market will be carried out in this study.

1.30 RESEARCH QUESTIONS

(i) What is the nature of the tariff and non-tariff barriers in cut flower export market?

(ii) Have the trends of export value from Kenya to various destinations been increasing, steady or decreasing?

1.40 OBJECTIVES OF THE STUDY

The general objective of the study is to carry out an economic analysis on major obstacles to optimal exploitation of the Kenya's cut flower export, market. For this to be achieved the following specific objectives need to be realized:

(i) Estimate the impact of real exchange rate (RER) changes on value of cut flower exported for the last twelve years (1991 – 2002).

(ii) Evaluate the impact of airfreight cost on cut flower exports.

(iii) Asses cut flower export value in relation to seasonality (four quarters).

1.50 HYPOTHESES

H_1 Real Exchange Rate (RER) is negatively correlated to foreign exchange earned from cut flower.

H_0 High airfreight cost (AIRCo) is statistically significant to cut flower value earned.

1.60 SIGNIFICANCE OF THE STUDY

Kenya is the second largest exporter (25%) of cut-flower to Europe. Most of this is sold in the Kenya's main outlet; Dutch flower auction market. The commodity fetches good price, like $0.6 per stem of roses. This, coupled with increased export volume, result to a rise in the annual foreign exchange earned like Us $132 in the year 2001, (See table I). The paper is therefore intended to analyse the economic importance of this commodity. This would fill the gap left by the previous analyst who never narrowed horticultural study this far.

CHAPTER TWO

2.10 LITERATURE REVIEW

Substantial research has been done on international trade where goods and services are imported and exported between Nations. However, very little have been studied on horticultural market in particular Cut-flower export. I will review both theoretical and empirical literature on export commodities in general linking it to horticultural produce.

2.20 THEORETICAL LITERATURE

The neoclassical model; Hecksher - Ohlin factor endowment trade theory took into account differences in factor supplies, (mainly land, labour and capital) in international specialization. If domestic factor-prices were the same, all countries would use identical methods of production and would therefore have same relative domestic product price ratios and factor productivity.

The basis of trade arises not because of inherent technological differences in labour productivity for different commodities between different nations but because nations are endowed with different factor supplies. Nations with cheap labour will have a relative cost and price advantage over countries with relatively expensive labour (skilled labour) in commodities that make abundant use of labour, Todaro, (2000). Kenya is an example of a nation with cheep labourers and therefore focuses on the production of these labour-intensive products like cut flowers for export earnings.

Underlying forces of demand and supply of a commodity, determine terms of exchange[1], Miller R. (1994). These terms are usually equal to the price of the good traded. Though price of a commodity is said to influence quantity demanded *cetaris paribus,* a shift in demand may occur due to indirect adjustments such as quality changes, Miller R.L (1997). For example, although the published price of bouquets of flowers may stay the same, the freshness of the flower may change, meaning that the prise per constant quality unit changes.

According to Yeats, (1979), agricultural products from developing countries are often severely curtailed by complicated systems of non-tariff barriers (NTBs)[2] in the industrial markets. Specifically, a study on the EU system found that domestic farmers were protected from foreign competition by at least fifteen different kinds of non-tariff measures varying from global or bilateral quota of production subsidies and variable import levies.

1.*conditions under which trading takes place*

2.*These encompass all private and government policies and practices that serve to distort the volume, commodity-composition or direction of trade in goods and services*

Finally, when a commodity is being exported, the exporters pay various costs like transaction costs[1]. These are costs associated with finding out exactly what is being transacted as well as the cost of enforcing contracts. The government minimizes these costs through some organs like the H.C.D.A that finds out information on the availability of the market for horticultural crops and advice the exporters appropriately. Exporter's incentives are part of these transaction costs. Exporters act as middlemen between producers of cut flowers and consumers[2]. This cost may be minimized through technological improvement via Internet services where exporters can sell and advertise their commodities.

2.30 EMPIRICAL LITERATURE

Study done by Salasya, (1989) found out that airfreight charges, price and changes in time (seasonality) have a significant effect on horticultural crop export. Though price was not significant at 5% level, airfreight charges were. She realized that the freight rate for cut flower was higher than those of other horticultural crops like fruits and vegetable. For example, while in 1988 the rate for fruits and vegetable was Ksh.16 per Kg that of cut flower was Ksh. 27.50 per Kg. The study carried out here agrees with her findings but will use a different approach to test for seasonality.

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1 Transaction cost; costs associated with exchanging including informational cost of finding out price and quality, service record and durability of a product, plus the cost of contract and enforcing that contact.

2. Consumer is the person to whom cut- flower is being sold in the world market

Nduati (1993) applied structure, conduct and performance (SCP) model to analyze markets system of cut flower in Kenya. He found out that high transport cost, low quality of planting materials, lack of appropriate transport vehicles, poor packing material and poor infrastructure were problems experienced by exporters of statice cut flowers. The study carried out here will basically look into export market unlike Nduati's.

Ikiara, (1992), specified a model that delineates the factors that influence the export performance of Kenya's horticultural industry, i.e.

$$X_{\Delta t}{}^{s} = b_o R^{b1}{}_t \cdot Y_f{}^{Fb2}{}_t \cdot A^{s\,b3}{}_t \cdot e^{b5L + b6\,Cs + ut} \qquad \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where: $X_{\Delta t}{}^{s}$; Annual volume of horticultural exports in tones (HCDA export statistics)

Y_f ; Foreign income (GDP per capita of UK, Germany, France, Italy and Netherlands in US$

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R_t ; Real exchange rate

$A^{s}{}_t$; Air cargo space capacity-annual cargo(1000 tons) destined to Kenya from UK, Continental Europe and Middle East (Egypt included)

L_t ; Lome convention where 1;after the convention

0; otherwise

Co_t ; External competition dummy

He applied OLS estimation technique on a semi-log linear model and found out that foreign income had the largest impact on volume of horticultural export. Lome' convention was not statistically significant at 5% level of significance. RER and air-cargo space availability enhanced horticultural export performance. Since the study being undertaken in this paper is after the lome' convention, this will not feature in the analysis. Instead of the air-cargo space (southbound freights) assumed later to be used for export of the horticultural produce, airfreight cost will be assessed.

Rotich (1993), applied the Policy Analysis Matrix (PAM) in his research and found out that not only were export incentives important but also nominal manipulation of exchange rate. He realized that the incentive packages, mainly tax exemption (indirect subsidy) ensures positive profit margin, which more than doubled after official exchange rate devaluation.

Prices of agricultural crops affect both volume and value of production. Prices may act as an incentive to agricultural producers according to Ommeh (1984). For example, in 1993 Kenya horticultural sector was hampered by low world prices and high cost of handling and storage facilities (Economic Survey, 1994).

Muga (2001) found out that EU is the Kenya's second most important market of horticultural produce in the world after Israel. In his study he found out that up to 1993, the EU dominated Kenya's export trade, it's share varied between 40% and 50% of the total However by 1994, this share had fallen to 34%. Between1994 and 1998, the EU share had averaged about 32.4% of the total exports.

Policy makers have suggested that protectionism by developed countries has played an important role in export of Non-traditional exports (NTXs), (Yeasts, 1981). Many development economists however maintain that inappropriate domestic policies greatly diminished Africans ability to compete internationally for example unilateral trade liberalization policy by Sub-Saharan Africa (SSA) countries results in poor trade performance in NTXs.

Mwega (forthcoming), assumes that the extent of response on NTXs to real exchange rate and trade liberalization policies in Kenya is minimal. His findings are that RER coefficients are insignificant at 5% level and suggest that RER has not played a significant role in the promotion of NTXs in Kenya. He used real GDP, the bilateral RER, lagged value for NTX as explanatory variables. It is noted that the ability of an exporter to respond the exchange rate and trade liberalization will depend on non-price variables. These non-price variables were classified into three broad categories. That is, availability of finances, infrastructure inadequacies (i.e. transport, water, energy, waste disposal and security) and lack of access to external markets arising from ignorance, poor quality of products, lack of interest and experience to sell abroad. The analysis hereby undertaken partially does agree with Mwega's finding. However instead of wholly terming RER insignificant at 5%level, its concluded that there is a low negative correlation between export and RER, see table III.

2.40 LITERATURE OVERVIEW

Problems facing horticultural sector have been cited and the extent to which, airfreight charges, foreign income, RER and air cargo space where quantitatively analyzed. Mwega sights the problem of exporters as lack of information awareness. He also like Nduati brings in government failure in provision of adequate infrastructure. The latter, indicated in Development plan2002-2008, has been a hindrance to maximum exploitation of cut flower export particularly road transport after the el-nino climatic condition.

External policies by the importing countries, e.g. EU member states, do play some role in the functioning of the Kenya export market. The Lome Convention as well as Post-Contonou Agreement has affected the export market as will be described in section 4.42.

CHAPTER THREE

3.10 METHODOLOGY

3.11 MODEL SPECIFICATION AND ESTIMATION TECHNIQUES

In this chapter, the model is specified and the techniques to be applied for estimation are discussed. To start with, the variables to be used in the model are explained.

Real exchange rate analyzed in this paper is based on definition stated below;

i.e. $$RER = \frac{e.r_f}{r_d}$$

Where

e: nominal exchange rate

r_f: foreign inflation rate (EU consumer price index)

r_d: domestic inflation rate (Kenya's' consumer price index)

An average of RER between Kenya and EU countries (Netherlands, UK, Germany, France, Sweden and Switzerland) have been calculated to arrive at the figure used in the analysis.

Averaged G.D.P in US$ of the EU countries, a proxy for wealth, is considered as playing a major role in this drastic increase on the demand of cut flower.

Airfreight cost (AIRCo) is based on the airfreight rates charged by the airlines for export of cut flower from Kenya to Netherlands. The book rates from International Association of Travel Agencies are used.

Seasonality (SES) in cut flower export arises as a result of changes in climatic conditions of the importing countries. During winter, there is little or no production in countries such as Holland This results in high demand of Kenya's cut flower, which is produced through out the year. Seasonality is treated as a dummy variable. Where by the four quarters stands for the four seasons. The first quarter will be the benchmark season; the coefficient of RER when Airfreight Cost (AIRCo) is held constant or the coefficient of AIRCo when RER is held constant. Other quarters have their coefficients, which indicates by how much the dependent variable Export Value (XPT) would differ with the first quarter.

The value of cut-flower export (XPT) is considered as a function of foreign GDP, RER overtime, AIRCo and seasonality. The later is treated as a dummy variable for each quarter.

i.e XPT= f (GDP, RER, AIRCo, SES).....3

Non-tariff barriers affect the cut-flower export market. The barriers act as constraints to full exploitation of cut flower export. It's not easy to quantify the impact of NTBs. However the market share of Kenya's cut flower export in the EU market in respect to other competitors may bring this into the picture. A descriptive approach has been applied.

3.12 THE EXPORT MODEL

Equation 3 can be written as a multiplicative function so as to estimate the elasticities as follows;

$$XP_t = b_o \, RER^{b1}_t \, . \, GDP_f^{b2} \, . \, AIRCo^{b3} . e^{b4D2 + b4D3 + b4D4} \quad \ldots\ldots 4$$

Whereby equation 4 will be reduced to linear semi-log form to give a linearlized equation.

$$\text{In } XPT_t = \text{In } b_o + b_1 \text{In } RER_t + b_2 \text{InGDP}_f + b_3 \, AIRCo + b_4 D_2 + b_5 \, D_3 + b_6 \, D_4 + \mu \ldots\ldots 5$$

Since the value for endogenous variables will be tested then the coefficients for each will be in β_i form. Such that the equation to be tested will be;

$$\text{In } XPT_t = \text{In } \beta_o + \beta_1 \text{ InRER}_t + \beta_2 \text{ InGDP}_f + \beta_3 \, AIRCo + \beta_4 D_2 + \beta_5 \, D_3 + \beta_6 D_4 + \mu \ldots\ldots 6$$

Where XPT_t ; Value of cut-flower for export

GDP_f ; Foreign Income (G.D.P.) time measured as average of the EU members

AIRCo ; Air freight charges (cost)

D_2 ; Second quarter dummy

1; presence of the quarter

0; otherwise stated

D_3 ; Third quarter dummy

1; presence of the quarter

0; otherwise stated

D_4 ; Fourth quarter dummy

1; presence of the quarter

0; otherwise stated

μ ; Disturbance Variable and

e ; Natural number

β_i ; Coefficients of the estimated independent variables. i = 1, 2, 3,4, 5 & 6

3.12 HYPOTHESES TESTED

The expected signs have been confirmed as $\beta_0, \beta_2, \beta_5, \beta_3 > 0$ and $\beta_1, \beta_4, \beta_6 < 0$

3.13 ESTIMATION TECHNIQUE

The study estimates elasticity of the independent over dependent variables by regressing equation 6 on time series quarterly data (1991 – 2002). OLS estimation technique has been used in the study because it gives linear, unbiased and efficient estimates.

Before applying the OLS, the data is subjected to diagnostic econometric tests to deal with problems like variation of monthly data, seasonality, spurious correlation and auto correlation. Unit-root tests are done to test for stationarity the absence of which the

data is subjected to first difference.

For example LNAIRCo is not stationary at first level and is therefore differenced to DLNAIRCo which is stationary as indicated by the Augmented Dickey-Fuller test equation in appendix I

3.20 DATA TYPE AND SOURCES

Secondary data was used for this study. The sources were HCDA, Fresh Produce Export Association (FPEAK), Kenya Flower Council (KFC), Central Business Information Services (CBIS) and Government publications like Economic Surveys and Statistical Abstracts International publications like World Atlas, World Bank publication were used.

3.30 LIMITATION OF THE STUDY

Specific data like airfreight rates was not available from the specific airlines like Kenya Airways and IATA book rates was used. Jomo Kenyatta International airport was considered as the port of exit though we have several others like Mombasa airport and Wilson airport. Some major exporters like Signord use their charter planes for exportation of the commodity and their airfreight cost were not taken into consideration. Monthly data of cut flower value and volume was converted to annual by using moving average of order 3.

CHAPTER FOUR

4.10 ANALYSIS AND INTERPRETATION OF THE RESULTS

4.11 INTRODUCTION

In this chapter, the OLS results are analyzed. E-views computer program was used to estimate the model. The dependent variable, export value was regressed against explanatory variables foreign GDP, airfreight Cost (AIRFCo), RER and Sesonality dummies (D2, D3 and D4 for second, third and fourth quarter respectively). The elasticity of each independent variable with respect to the dependent variable is discussed.

4.12 REGRESSION ANALYSIS: ELASTICITIES OF CUT FLOWER EXPORT

In this section a time series analysis is carried out. Equation 6 is hereby subjected to an OLS regression to test for elasticities of the explanatory variables on the dependent one. This was done after each semi-logged independent variable was subjected to an Augmented Dickey-Fuller test, a unit-root test for stationarity, see appendix I. Such that when LNAIRCo was found not to be stationary at5% critical level, it was differenced to DLNAIRCo. Regression trials of the model showed that the coefficient obtained for the foreign LNGDP, D2 and D3 is not statistically significant at 5% level of significance and were subsequently dropped. The results obtained after running the regression are summarized in table II.

TABLE II: OLS REGRESSION

Dependent Variable: DLNXPT
Method: Least Squares
Sample(adjusted): 1991:4 2002:2
Included observations: 43 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRER	-0.010662	0.005208	-2.047136	0.0476
DLNAIRCO	1.200838	0.173609	6.916893	0.0000
D3	0.069405	0.120628	0.575362	0.5684
D4	-0.306543	0.184988	-1.657092	0.1057
C	0.642890	0.296414	2.168891	0.0364

R-squared	0.824316	Mean dependent var	0.061562
Adjusted R-squared	0.805823	S.D. dependent var	0.581403
S.E. of regression	0.256198	Akaike info criterion	0.223213
Sum squared resid	2.494225	Schwarz criterion	0.428004
Log likelihood	0.200917	F-statistic	44.57442
Durbin-Watson stat	2.522715	Prob(F-statistic)	0.000000

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DLNXPT = 0.6429 - 0.0107 LNRER + 1.2008DLNAIRCO + 0.0694D3 -0.3065D4

At 5% level of significance LNRER, DLNAIRCo and fourth seasons (quarter) are statistically significant. The signs for these variables are as expected a prior. The model fit at 82% as indicated by the R-squared. The standard error of the regression and sum-squared residual are low, close to zero to confirm the goodness of fit of the model.

The estimates of the parameters of the variables provided information about the effects of a given explanatory variable on Kenya's cut flower export market. The coefficients are short-run elasticities of the value of cut flower exported between 1991and 2002 with respect to various variables. A partial regression coefficient reflects the (partial) effect of one explanatory on the mean value of the dependent variable when values of other explanatory variables included in the model are held constant, Gujarati D. (1992). Each regression coefficient estimated by the OLS is linear and unbiased-on the average it coincides with the true value.

4.20 DIAGONISTIC TEST CARRIED OUT

4.21 TEST FOR AUTO-CORRELATION

In this section, an auto-correlation test is done. This is achieved by use of a Durbin-Watson (DW) test at 38 degree of freedom and 5% level of significance. A null hypothesis of zero auto-correlation is tested against the alternative hypothesis of the first order auto-correlation. The DW test conducted showed that the d-critical values ranges between 1 281 and 1 756 while as d-calculated was 2.523 at 5%level of significance. Since the latter lies above the upper boundary (d_u) and is around two, the null hypothesis is accepted. This indicates absence of auto-correlation that increases the confidence that the results could be accepted.

4.22 TESTING FOR THE NORMALITY OF THE ERROR TERM

The assumption of normality is necessary but not sufficient for conducting the statistical test of significance of the parameter estimates and for constructing confidence level, Koutsoyianis, (1997). A test of chi-square (X^2) is undertaken in this analysis as a measure of normality. It is hereby concluded that $X^2 > 53.5$ at 5% statistical level of significance with 38 degree of freedom.

I.e. pr ($X^2 > 53.5$)=0.05 when df=38 thus accepting H_o (the null hypothesis) that the error term is normally distributed. Therefore the model is correctly specified and test of significance carried out is valid.

4.23 TESTING FOR HETEROSKEDASTICITY

An F-test is hereby done for a test of heteroskedasticity, (see appendix II). If F-calculated is less than F-critical, the null hypothesis cannot be rejected. It is accepted that the problem of auto-regression conditional heteroskendasticity is absent.

In this analysis F-calculated =1.984 < F-critical. Therefore the condition of heteroskedasticity is absent.

4.24 CORRELATION ANALYSIS

The primary objective in correlation analysis is to measure the degree of linear correlation between two variables. A simple correlation coefficient measures this strength of association, that is, the extent to which the variables are linearly related.

There exists a very high positive correlation (+0.89) between cut flower export value (XPT) and airfreight cost (AIRCO). Similarly, there is a positive correlation between XPT and fourth season of 0.71 that is also high. However a negative correlation of –0.51 is indicated by third season. There is a low negative correlation between XPT and RER. See table III below.

TABLE III CORRELATION MATRIX

	DLNXPT	LNRER	DLNAIRCO	D3	D4
DLNXPT	1.000000				
LNRER	-0.187811	1.000000			
DLNAIRCO	0.891060	-0.062060	1.000000		
D3	-0.512564	0.121656	-0.560165	1.000000	
D4	0.707745	-0.066235	0.853988	-0.322749	1.000000

4.25 THE EXPLANATORY POWER OF THE MODEL

The R^2 measures the goodness of fit and thus summarizes the explanatory power of the model. It measures the proportion of the total variation in the dependent variable that could be attributed to the explanatory variables included in the model.

According to the R^2 obtained for the estimated model the five explanatory variables fitted in the model explains 82% of the total variation in the value of the exported cut flower (XPT)

Other indicators of the confidence with which the estimated coefficient could be interpreted included sum of squared residuals and standard error of the regression. These are as low as possible; closer to zero.

4.30 EXPLANATORY VARIABLES

4.31 REAL EXCHANGE RATE (RER)

Real exchange rate is statistically significant at 5% level of confidence and has the correct sign a priori. As shown in the regression table I, a decrease of a unit RER (say by devaluation of nominal exchange rate), *ceteris paribus*, would increase cut flower export value by US$ 0.011.

4.32 AIRFREIGHT COST

There exist a positive correlation, as expected, between export value of cut flower and airfreight cost. The more the exports value the higher the cost of airfreight. A 120% increase in exports increases cost by 100%

4.32 SEASONALITY

The second quarter (season) is not statistically significance at 5% level in respect to cut flower export value. However first, third and fourth seasons are statistically significant at 5% level of significance. This suggests that the average level of export value (XPT) differ among the quarters. The differential slope coefficients tell by how much the slope coefficient of the third and fourth quarter differs from that of the base (first) quarter. This will be interpreted as follows:

Holding RER constant, the fourth quarter differs from the first quarter by 0.3364 (is higher by 34%)

i.e. (0.6429-0.3065) + 1.2008LNAIRCO

Similarly the third quarter differs by 0.7123 (71%) with the first quarter

i.e. (0.6429+0.0694)+1.2008LNAIRCO

Wheras holding AIRCO constant the forth quarter differs by 0.3364 (34%)

i.e. (0.6429-0.3065) – 0.0107 RER

Similarly the third quarter differs with the first quarter by, 0.5735 (57%) RER, *cetaris paribus,*

i.e. (0.6429+0.0694) – 0.0107 RER

The forth quarter and the first quarter are more significant to cut flower export because the production in the EU by our competitor, like Netherlands, is low during winter.

4.40 QUALITATIVE ANALYSIS

4.41 MARKET SHARE

In this study, market share is used to capture the concept of competition. That is, how Kenya's cut flower exporters have been competing with the other foreign exporters. The table IV, next page, will throw some light into this.

Kenya exporters of cut flower compete fairly well in Netherlands than in Germany during the two years. In Netherlands, there was 138% increase in export between 1991 and 1995 and position two in exchange earning after Israel. There was a good improvement in export of cut flower to Germany in 1995 where Kenya moved from position three in 1991 after Israel and Columbia to first position in 1995. This was a result of improved photo-sanitary measures as well as quality improvement of the bud and stem of cut flower.

However Kenya's export to France declined by 30%. During the same period, Columbia export to the same destination improved by 42%. It need to be noted here that the Columbian rose flowers for example have bigger buds than Kenya's due to different climatic conditions. The Columbian rose flower has a competitive advantage in France.

TABLE IV

CUT FLOWER EXPORT MARKETS AS PER ORIGIN AND DESTINATIONI

1991 AND 1995 in Million US$

IMPORTERS

	NETHRLANDS		FRANCE		GERMANY	
YEAR	1991	1995	1991	1995	1991	1995
EXPORTERS						
KENYA	25.5	60.8	1.3	0.9	17.7	24.2
ISRAEL	68.9	95.2	2.4	5.1	24.7	21.6
COLUMBIA	7.9	14.8	3.3	5.7	23.9	19.6
EQUADOR	1.4	8.4	0.5	1.7	1.9	6.0
S AFRICA	2.7	3.4	0.5	0.5	5.0	5.2
COSTA-RICA	0.1	1.1	0.04	1.0	0.7	2.4
THAILAND	3.1	2.1	1.0	1.5	4.3	3.9
ZIMBAMBWE	13.5	36.5	0.03	0.4	0.6	5.5

Source: ITC (1997), Produce and Market Development; cut flower, Geneva

4.42 TARIFF AND NON-TARIFF BARRIERS

On trade and investment policies, significant tariff reform has been underway since 1981 both as an inducement for domestic industry to operate efficiently and to reduce costs for potential exporters. High tariff structures inhibit direct and indirect exporters from obtaining inputs rapidly at world or near world prices. Exporters of cut flower from Kenya abroad is charged a tariff of Ksh 0.45 per Kg plus other charges and levies like local council's fees and charges.

At the export market, EU, the exporters of cut flower are charged entry tariff. In the Netherlands market, which is very important to Kenya flower export, this tariff has been increased from 14 to 15.5 euros per 10,000 stems.

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EAST AFRICANA COLLECTION

Kenya, unlike other competitors from sub-Saharan Africa, has been categorized as non-less developed country. This means that Kenya would have to negotiate a separate Regional Partnership Agreement, unlike the Preferred Trade Group. This is in accordance to year 2000 Post-Cotonou Agreement, ending in year 2007, which is an extension of the year 1997 lome convention between European Union and the African Caribbean and Pacific countries.

CHAPTER FIVE

5.10 SUMMARY AND POLICY RECOMMENDATION

Kenya cut flower export market has done very well at a market share of 25% in the EU market becoming second after Israel. The cut flower foreign earning has been leading other horticultural produce as indicated in table I. This has been a result of the improved packaging and storage facilities.

Increased inflation rate and nominal exchange has affected the RER that is negatively correlated to cut flower export value (XPT). Devaluation of the exchange rate, when Kenya had fixed exchange rate system (1991-1994), improved the foreign exchange earned from the commodity. Currently the forces of demand and supply for exports dictate the exchange rate. The government intervention would therefore be necessary to put the exchange rate at a check such that price for our export commodity is attractive to foreigners than those of our competitors. However this should be in line with the government macro economic policy objectives on the economy.

The Kenya cut flower export improved in the year 2002 as a result of selling directly to the dealers in the foreign market unlike wholly depending on the Dutch and others auction market. Therefore there is need to diversify market. This can be achieved if the value were added to the product at the production level through quality inspection and standards by even involving the buyer-to-be

The exporters as well as the farms owners need to exploit exhibition opportunities wherever and whenever they occur so as to advertise this commodity. Cut flower market in the COMESA, East Africa community and the Asian market need be assessed for exploitation.

The Kenyan government needs to renegotiate with the EU on the post-contonou agreement for Kenya to be rightfully considered as a less developed country. The high entry tariff in some of the foreign market needs renegotiations as well.

5.20 AREAS FOR FURTHER STUDY

The high freight charges for the horticultural produce particularly during the peak period need be reduced. Could there be some positive correlation with the cost of Jet fuel from Kenya? The liberalization of the air lines and it's impact on the air freight rates need be investigated.

An increase in foreign exchange earned from cut flower should translate to improved standards of the people working and living around the flower farms. This would be realized by improved infrastructure like roads and clean water supply. Has this been the case? How can cut flower earnings be related to the opportunity cost of food security and health? A research on this area would clearly show the importance of cut flower production and exportation.

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APPENDIX I

UNIT-ROOT TEST

ADF Test Statistic	-3.626159	1% Critical Value*	-4.1896
		5% Critical Value	-3.5189
		10% Critical Value	-3.1898

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNRER)
Method: Least Squares

Sample(adjusted): 1992:1 2002:2
Included observations: 42 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRER(-1)	-0.411270	0.113418	-3.626159	0.0008
D(LNRER(-1))	0.194822	0.147211	1.323420	0.1936
C	24.96563	6.692939	3.730144	0.0006
@TREND(1991:3)	-0.069877	0.067996	-1.027654	0.3106

R-squared	0.265245	Mean dependent var	0.445238
Adjusted R-squared	0.207238	S.D. dependent var	5.954183
S.E. of regression	5.301438	Akaike info criterion	6.264226
Sum squared resid	1067.999	Schwarz criterion	6.429718
Log likelihood	-127.5487	F-statistic	4.572631
Durbin-Watson stat	1.743266	Prob(F-statistic)	0.007876

ADF Test Statistic	-10.34740	1% Critical Value*	-4.1958
		5% Critical Value	-3.5217
		10% Critical Value	-3.1914

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DLNXPT)
Method: Least Squares

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Sample(adjusted): 1992:2 2002:2
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNXPT(-1)	-1.952917	0.188735	-10.34740	0.0000
D(DLNXPT(-1))	0.614024	0.121686	5.045967	0.0000

C	0.048502	0.154202	0.314538	0.7549
@TREND(1991:3)	0.001465	0.005939	0.246682	0.8065

R-squared	0.775196	Mean dependent var	-0.016449
Adjusted R-squared	0.756969	S.D. dependent var	0.911626
S.E. of regression	0.449415	Akaike info criterion	1.330729
Sum squared resid	7.473043	Schwarz criterion	1.497907
Log likelihood	-23.27995	F-statistic	42.52931
Durbin-Watson stat	2.961432	Prob(F-statistic)	0.000000
ADF Test Statistic	-9.398906	1% Critical Value*	-4.1958
		5% Critical Value	-3.5217
		10% Critical Value	-3.1914

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DDLNAIRCO)
Method: Least Squares

Sample(adjusted): 1992:2 2002:2
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDLNAIRCO(-1)	-1.938848	0.206284	-9.398906	0.0000
D(DDLNAIRCO(-1))	0.568967	0.131106	4.339753	0.0001
C	0.180004	0.151796	1.185832	0.2432
@TREND(1991:3)	-0.003340	0.005815	-0.574410	0.5692

R-squared	0.748000	Mean dependent var	-0.018664
Adjusted R-squared	0.727568	S.D. dependent var	0.840676
S.E. of regression	0.438791	Akaike info criterion	1.282883
Sum squared resid	7.123903	Schwarz criterion	1.450060
Log likelihood	-22.29909	F-statistic	36.60848
Durbin-Watson stat	2.995897	Prob(F-statistic)	0.000000
ADF Test Statistic	-8.511497	1% Critical Value*	-4.1896
		5% Critical Value	-3.5189
		10% Critical Value	-3.1898

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(D2)
Method: Least Squares

Sample(adjusted): 1992:1 2002:2
Included observations: 42 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D2(-1)	-2.000000	0.234976	-8.511497	0.0000
D(D2(-1))	0.500446	0.145051	3.450145	0.0014
C	0.479929	0.135819	3.533586	0.0011
@TREND(1991:3)	0.000892	0.004843	0.184197	0.8548
R-squared	0.738032	Mean dependent var		0.023810
Adjusted R-squared	0.717350	S.D. dependent var		0.715272
S.E. of regression	0.380273	Akaike info criterion		0.994539
Sum squared resid	5.495094	Schwarz criterion		1.160032
Log likelihood	-16.88532	F-statistic		35.68527
Durbin-Watson stat	2.912995	Prob(F-statistic)		0.000000
ADF Test Statistic	-8.518852	1% Critical Value*		-4.1896
		5% Critical Value		-3.5189
		10% Critical Value		-3.1898

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(D3)
Method: Least Squares

Sample(adjusted): 1992:1 2002:2
Included observations: 42 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D3(-1)	-1.952421	0.229188	-8.518852	0.0000
D(D3(-1))	0.476636	0.138149	3.450145	0.0014
C	0.495327	0.133760	3.703107	0.0007
@TREND(1991:3)	-0.000850	0.004726	-0.179758	0.8583
R-squared	0.738318	Mean dependent var		0.000000
Adjusted R-squared	0.717659	S.D. dependent var		0.698430
S.E. of regression	0.371117	Akaike info criterion		0.945792
Sum squared resid	5.233645	Schwarz criterion		1.111284
Log likelihood	-15.86162	F-statistic		35.73810
Durbin-Watson stat	2.913118	Prob(F-statistic)		0.000000
ADF Test Statistic	-8.926571	1% Critical Value*		-4.1896
		5% Critical Value		-3.5189
		10% Critical Value		-3.1898

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(D4)
Method: Least Squares

Sample(adjusted): 1992:1 2002:2

Included observations: 42 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D4(-1)	-2.000000	0.224050	-8.926571	0.0000
D(D4(-1))	0.500406	0.136128	3.675979	0.0007
C	0.481752	0.131794	3.655336	0.0008
@TREND(1991:3)	0.000811	0.004618	0.175625	0.8615

R-squared	0.761828	Mean dependent var	-0.023810
Adjusted R-squared	0.743025	S.D. dependent var	0.715272
S.E. of regression	0.362591	Akaike info criterion	0.899310
Sum squared resid	4.995945	Schwarz criterion	1.064802
Log likelihood	-14.88551	F-statistic	40.51615
Durbin-Watson stat	3.004066	Prob(F-statistic)	0.000000

APPENDEX II

Heteroskedasticity Test

White Heteroskedasticity Test:

F-statistic	1.984042	Probability	0.065897
Obs*R-squared	17.76548	Probability	0.087184

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/14/03 Time: 16:28
Sample: 1991:4 2002:2
Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.458027	0.547889	-0.835985	0.4096
LNRER	0.013651	0.018411	0.741493	0.4640
LNRER^2	-8.35E-05	0.000154	-0.542731	0.5912
LNRER*DDLNAIRCO	-0.008670	0.011907	-0.728196	0.4720
LNRER*D3	0.000886	0.005931	0.149432	0.8822
LNRER*D4	0.004904	0.010073	0.486868	0.6298
DDLNAIRCO	0.433137	0.674113	0.642529	0.5253
DDLNAIRCO^2	0.281125	0.301918	0.931131	0.3590
DDLNAIRCO*D3	-0.138966	0.305578	-0.454765	0.6524
DDLNAIRCO*D4	-0.122566	0.562215	-0.218005	0.8289
D3	-0.199728	0.390003	-0.512119	0.6122
D4	-0.332607	0.668884	-0.497257	0.6225

R-squared	0.413151	Mean dependent var	0.058005
Adjusted R-squared	0.204914	S.D. dependent var	0.100204
S.E. of regression	0.089349	Akaike info criterion	-1.761597
Sum squared resid	0.247483	Schwarz criterion	-1.270099
Log likelihood	49.87433	F-statistic	1.984042
Durbin-Watson stat	1.441650	Prob(F-statistic)	0.065897

TABLE V: DATA COLLECTED

YEAR		Cut flower VOLUME (tons)	Cut flower VALUE XPT (M)	RER'	GDP(Y_t) M	AIRCo	D2	D3	D4
1991	III	2571	3.5	40.6	1035280	1	0	1	0
	IV	5629	7	39.6	1120560	2.3	0	0	1
1992	I	6506	14.2	59.9	1142470	3.2	0	0	0
	II	5240	10 5	56.8	1167390	2.7	1	0	0
	III	2574	4.9	54.5	1273400	1.3	0	1	0
	IV	5487	9.8	58.7	1168470	3.2	0	0	1
1993	I	6123	17.4	57.7	1098230	4.2	0	0	0
	II	5728	10.1	77.4	1131710	4.2	1	0	0
	III	4858	7.6	77.2	1089670	3.7	0	1	0
	IV	6927	10.6	75.4	1099490	6.5	0	0	1
1994	I	7530	11.8	65.6	1120040	8.1	0	0	0
	II	5107	8.8	58	1172330	5.1	1	0	0
	III	3008	5.7	54.1	1231450	2.8	0	1	0
	IV	8478	20.2	45.1	1261450	8.7	0	0	1
1995	I	9172	25.6	44.4	1363660	9.8	0	0	0
	II	7455	18.6	49.6	1442770	7.5	1	0	0
	III	3437	3.9	59.3	1423840	3.3	0	1	0
	IV	9304	20.6	55	1444980	10.1	0	0	1
1996	I	9413	26	56.3	1442300	10.5	0	0	0
	II	8769	15	55.5	1418430	9.3	1	0	0
	III	5628	10.4	54.8	1440500	5.9	0	1	0
	IV	11402	24.9	50.7	1460620	14.5	0	0	1
1996	I	11135	23	47.7	1377670	14.1	0	0	0
	II	8893	19.9	44.7	1367030	10.8	1	0	0
	III	4640	15.1	54.1	1321940	5.2	0	1	0
	IV	9997	25.7	54.7	1379340	12.9	0	0	1
1997	I	8797	28.8	48.8	1353570	12.3	0	0	0
	II	6731	18	49	1381330	8.9	1	0	0
	III	4754	13.2	49.2	1422770	5.7	0	1	0
	IV	9937	26.4	52.1	1493370	13.1	0	0	1
1998	I	11051	34.9	52.5	1445770	15.3	0	0	0
	II	8234	23.8	56.6	1387710	11	1	0	0
	III	6012	15.7	60.6	1402470	7.5	0	1	0
	IV	11694	29.8	61.2	1427600	16.6	0	0	1
1999	I	11475	34.8	56.2	1376670	17.4	0	0	0
	II	7800	22.4	57.4	1322700	11.5	1	0	0
	III	6763	19.3	55.8	1281590	9 7	0	1	0
	IV	12715	33.7	56.7	1255560	21.1	0	0	1
2000	I	12029	25.3	57.6	1319210	20 2	0	0	0
	II	10123	31.9	57 2	1266380	16 1	1	0	0
	III	7825	26.8	57 7	1292660	12.1	0	1	0
	IV	11415	38 5	58	1290210	19.3	0	0	1
2001	I	15188	47.8	58 7	1302620	25.8	0	0	0
	II	10314	49.4	58.3	1363100	16.7	1	0	0