The Performance of Ghana's Papaya in the Export Industry

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Introduction

The domestic economy of Ghana continues to revolve around subsistence agriculture which accounts for 36 percent of GDP and employs 60 percent of the work force constituting mainly small-scale farmers (Ghana Statistical Service, 2004). Agricultural export plays a very critical role in the economic growth of Ghana. Ghana, with abundant natural resources, relies heavily on export of primary commodities such as cocoa, timber and gold for foreign exchange earnings. In order not to over rely on the few primary commodities for foreign exchange, an Economic Recovery Program (ERP) which was directed towards the development and promotion of Non-Traditional Exports (NTE's) was introduced in 1983 and saw Ghana begin to open up its economy and participate in international trade.

The Ministry of Food and Agriculture (MoFA) is promoting selected commodities to improve their access to markets and this includes NTE crops. Papaya is one of the few fruit crops that has been selected for food security and promoted over medium to long-term (MoFA, 2002). The objective is to achieve high production levels and profitability for all scales of production. Ghana's papaya export is very low compared to the export of other NTE commodities like pineapple and banana. In 1990, Ghana earned $62.8 million from NTE with papaya contributing 0.01 percent (GEPC, 2000). Papaya export has been increasing over the years but given the high demand for papaya, much can be done to improve its production and therefore its export into the international market.

The study therefore describes the trend and the annual growth rate in the volume of export, number of exporters and the percentage contribution of papaya to Agricultural Horticultural Export Earnings (AHEE); identifies and quantitatively estimates the magnitudes in the determinants of export demand of Ghana's papaya; analyzes the constraints affecting the papaya export industry in Ghana.

Material and Methods

The study was conducted in Ghana which is in West Africa. The focus of this study is not on the production but the export of the commodity so it focussed mainly on the major exporters of papaya.

The study used both primary and secondary data; the primary data involved the use of well structured questionnaire while the secondary data was obtained from the Ghana Export Promotion Council (GEPC) as well as from Journals and other publications including that of the Food and Agricultural Organization (FAO) and the International Monetary Fund (IMF) database. Primary data was obtained from 30 major papaya exporters who are scattered in the country to

solicit information regarding the constraints to export. Annual time series data, from 1987 to 2006, on quantity exported (in metric tons) and the export value (in US dollars) of Ghana's papaya were obtained from Ghana Export Promotion Council (GEPC). The value of Ghana's papaya was divided by volume to obtain the price per ton of Ghana's papaya. The price per ton was in turn used to represent the international price of Ghana's papaya. Trade weighted average per capita income of Ghana's trading partners (Y_t) was estimated as follows: the proportion of each of Ghana's trading partner's imports of Ghana's papaya was calculated for each year. The ratio of real Gross Domestic Product (GDP) of trading partners to their respective populations was calculated to determine the real per capita incomes. The product of the real per capita income of each of trading partner and its proportions of papaya imported from Ghana by each trading partner was computed. The values for each trading partner were summed up across the countries for each year to obtain the total trade weighted real per capita income. The trade weighted real per capita incomes were calculated in US dollars. Ghana's main trading partners in papaya are Germany, Netherlands, UK and US. Data on nominal per capita GDP, world and country level imports of papaya, consumer price indexes (2000 prices) as well as population of the importing countries were obtained from IMF's World Outlook Database.

Graphical relationships and trend equations were used to describe the trend and the annual growth rates. However, the annual growth rate is achieved by using the semi-log regression model:

$$\ln PNX_t = a_o + a_1 T$$

where a_o = the intercept term,

$\quad\quad a_1$ = coefficient of time, T

The coefficient a_1, measures the growth rate in the volumes of exported papaya, the number of exporters and the percentage contribution of papaya to AHEE over the period. The PNX_t depicts the volume, number of exporters and the percentage contribution of papaya.

From literature, the major determinants of export demand for Ghana's papaya are the own price of papaya, the real incomes of major importing nations, quantity demanded the previous year and taste and preferences. Therefore, with regards to the above determinants, the export demand function for Ghana's papaya is given by:

$$Q_t^d = Q^d (P_t, Y_t, Q_{t-1}^d, T_t)$$

where Q_t^d = Quantity of Ghana's papaya demanded by major foreign trading partners in year t,

$\quad\quad P_t$ = Real Export Price of papaya

$\quad\quad Y_t$ = Trade weighted real per capita incomes of major importing countries

$\quad\quad Q_{t-1}^d$ = Quantity demanded of papaya in the previous year.

$\quad\quad T_t$ = Trend term proxying taste and preferences of major importing countries.

The export demand model for Ghana's papaya that is considered in this study is specified econometrically by:

$$\ln Q_t^d = a_o + a_1 \ln P_t + a_2 \ln Y_t + a_3 \ln Q_{t-1}^d + a_4 T_t + e_{1t}$$

The coefficients a_1, a_2, a_3, and a_4 are the Short Run Elasticity's and they represent the parameters of the export demand function. e_{1t} is the error term which satisfies the classical normal regression assumptions whiles a_o is the intercept term.

Literature revealed that some of the constraints to the papaya export industry in Ghana are mainly lack of trained staff to handle the produce and make sure it meets international standards, cold store, forklift at the port, quality card boxes, transporters, pack house, drying tables, water troughs and water reservoirs. The Kendall's coefficient (w) is given by:

$$w = 12S [m^2 (n^3 - n)]^{-1}$$

where w = Kendall's coefficient

$\quad\quad m$ = number of rankings by the exporters

n= number of logistic constraints being ranked

The significance of *w* was tested using the expression:
$$Z=0.5\log_e[(m-1)/w](1-w)$$

Results and Discussion

The figures below shows the growth rate in the number of exporters, volume of exported papaya and the percentage contribution of papaya to AHEE.
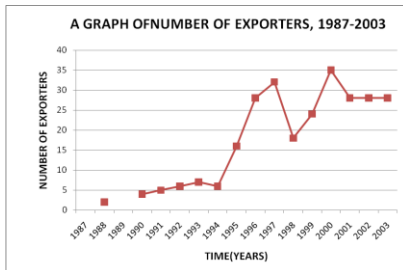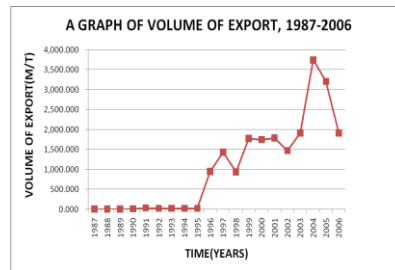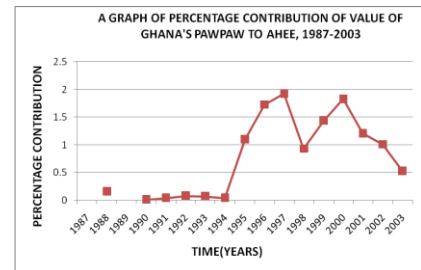

Fig. 1

Fig. 2

Fig. 3

Log (NUM) = 364.7154+0.184012T   (1)
Log (Volume) =-923.0876+0.464884T   (2)
Log (PERC CONTRB) = -558.1449+0.2791T   (3)

From equation 1.0, the number of exporters of papaya increased over the period 1987-2003 with an annual growth rate of 18.4 percent. The trend of number of exporters in fig. 1 shows an initial increase in the number of exporters which can be attributed to the realization of the prospects and opportunities in the papaya export industry. Prospective exporters took advantage of this and included the export of papaya to their export commodities. The decline in the total number of exporters can be attributed to the low volume of rainfall recorded by the country in 1998. This led to only few exporters getting access to the scarce fruit to export. The number of exporters increased again from 1998 to 2000 when rainfall became abundant and the rise in the real price of the fruit in the international market.

An annual growth rate of 46.49 percent which is significant at 1 percent level of significance implies that the volume of export increased annually by 46.49 percent over the period, 1987-2006. The trend in fig.2 shows a more or less steady growth in the volume of papaya exported from 1987-1995. This is attributed to the fact that exporters where now realising the prospects in exporting papaya so production remained fairly constant due to only few number of exporters between those periods. The sharp increase in the volume exported from 1995 to 1997 was because the GEPC introduced various policies in the export market and intensified programs to promote the expansion of NTE commodities in the export market. It was also due to the increase in the number of exporters of Ghana's papaya and the increase in the real prices of papaya. The rise in the volume from 1998 to 1999 was due to the high demand for the fruit in the international market. The sharp increase in the volume exported from 2002 to 2003 was due to the increasing demand and the high real international prices in the export market.

An annual growth rate of 27.91 percent which is significant at 1 percent implies the percentage value contribution of papaya to NTAC increased annually by 27.91 percent for the period 1987-2003. From fig. 3, the significant increase in the number of papaya exporters and the volume of export gave rise to a relatively high contribution of papaya to the NTE sector. It can also be seen that, when the number of exporters decreases, the percentage contribution also decreases and vice versa. The number of exporters is therefore directly proportional to the contribution they make to the NTE sector.

Table 1.0 Regression of export quantity demanded of Ghana's papaya

Dependent Variable: $LOG(Q_t^d)$
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$LOG(P_t)$	-1.662342	0.331515	-5.014376	0.0010
$LOG(Y_t)$	1.105153	0.316456	3.492277	0.0082
$LOG(Q_{t-1}^d)$	0.854348	0.125578	6.803327	0.0001
Dum	0.121203	0.293172	0.413421	0.6902
C	28.13926	5.620487	5.006552	0.0010
T_t	-0.008756	0.062976	-0.139033	0.8929

R-squared	0.989753	Mean dependent var	6.246392
Adjusted R-squared	0.983349	S.D. dependent var	2.128443
S.E. of regression	0.274655	Akaike info criterion	0.550928
Sum squared resid	0.603485	Schwarz criterion	0.824809
Log likelihood	2.143507	F-statistic	154.5425
Durbin-Watson stat	2.768677	Prob(F-statistic)	0.000000

From Table 1.0, the real export price of papaya conforms to *a priori* expectation and significantly affects the quantity demanded for Ghana's papaya at 1 percent level of significance. All things being equal, a 1 percent decrease in the real export price of papaya will result in a 1.6623 percent increase in the quantity demanded for Ghana's papaya. The trade weighted real per capita income of major importing countries also conforms to a priori expectation and significantly affects the quantity demanded for Ghana's papaya at 1 percent significance level. A 1 percent increase in the trade weighted real per capita income of major importing countries will lead to a 1.1052 percent increase in the quantity demanded for Ghana's papaya implying that Ghana's papaya is income elastic. This means that, as income increases, the demand for Ghana's papaya increases more than the increase in income. The previous year's quantity demanded of Ghana's papaya significantly affects the export demand for Ghana's papaya at 1 percent level of significance and conforms to a priori expectation. The trend term proxying taste and preferences in the consuming countries does not significantly affect quantity demanded for Ghana's papaya at even 10 percent level of significance but conforms to *a proiri* expectation. As the years pass by, taste and preferences of the importing countries tend to move away from Ghana's papaya. The dummy variable takes care of the outliers 2004 and 2005 and do not significantly affect the demand function.

Table 2.0 Results of Ranking of the Constraints

N=30
Estimated Kendall's Coefficient, w= 0.870
Z calculated= 8.73
Z critical from Fischer's Z distribution table= 1.880

The estimated Kendall's w of 0.870 also shows that there is about 87 percent agreement between the constraints ranked by the exporters. The results show that pack house, trained staff and transporters are the most pressing constraints in the export of Ghana's papaya. This is because of their major roles as the major inputs to papaya export. The pack houses and the trained staff are needed to meet most of the standards set by GLOBAL-GAP certification. When these are absent,

the requirements of GLOBAL-GAP are violated and therefore the produce sent to the international market would be rejected. It is therefore important for exporters of papaya to at least have access to these two inputs. The pack house ensures that the harvested papaya is stored and packed under the right conducive conditions which would not expose the fruit to elements of spoilage life temperature, moisture, among others. Trained staff is needed to handle the fruits very well so that they can meet international standards. The quality of the card boxes is also very important in the papaya export industry as it also ensures the safety of the produce. Although this is a constraint, it is not so pressing to the exporters. Water reservoirs, water troughs and drying tables are the least ranked constraints.

Conclusions and Outlook

There has been significant increase in the number of exporters, the volume of papaya exported and the percentage contribution of papaya to AHEE with growth rates of 18.4, 46.4 and 27.9 percent annually. The quantity demanded of Ghana's papaya is highly price elastic meaning more will be demanded when the price goes down, ceteris paribus. Also, the trade weighted real per capita income of major importing countries of Ghana's papaya is highly significant and elastic at 1 percent significance level. Thus, an increase in the per capita incomes of Ghana's papaya importing countries could lead to a larger increase in quantity demanded for her papaya produce. Pack house, trained staff, transporter and fork lift were found to be the most pressing needs in papaya export because these are needed in order for an exporter to be certified to export to the international market. Inability to have these would lead to rejection of one's produce because the pack house, which is their most pressing need, ensures that the produce are stored and packed under the right conditions so that they are not exposed to elements of spoilage and are very expensive for especially small scale. Trained staff is also needed to handle the fruits well so the there will not be bruises of any kind as this renders their produce unsafe for export. There is the need to put in place policies that will serve as inducement for more people to enter into production and export of papaya. As the number of papaya producers and exporters increase, it will lead to an increase in the volume that is exported thereby increasing the contribution papaya makes to AHEE. This will go a long way to increasing the country's GDP. There is also the need to implement irrigation schemes to ensure that there is always constant supply of water for papaya farmers as this will in turn increase the volume produced and consequently increase the volume that is exported. There is the need to reduce cost to bring down product prices. More extension agents need to be trained to impart more knowledge on export requirements such as proper handling and grading so that the produce that is exported to the international market will meet international standards set by GLOBAL-GAP as this will go a long way to increase the volumes of papaya exported and thereby increase the country's GDP. Equipments such as pack houses, cold store, transporters and forklifts which are constraints to papaya export should be provided by the Government for exporters to take advantage and increase the volume that they export.

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