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ANALYSIS OF TRADE IMPACTS ON THE FRESH PINEAPPLE SECTOR IN GHANA

by

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EXECUTIVE SUMMARY

Ghanaian firms began exporting by air the Smooth Cayenne (SC) variety of fresh pineapple to Europe in the mid 1980s, relying on smallholders who contributed about 50% of export volumes. Sea-freighting pineapples commenced in 1994, and by 1999, contributed more to export volumes from Ghana than air-freighted fresh pineapples. The industry experienced growth from 1994 to 2004 at a cumulative annual growth of 172%. This resulted in increased market share of fresh Ghanaian pineapples in Europe from 7 – 8% in 1999, to 10% in 2004 with an annual volume of 71,000 MT.

Since 2004, however, the fresh pineapple export industry has experienced declined volume of exports due to a number of reasons, principally, a shift in market demand to the MD2 variety of pineapple produced primarily in Costa Rica by Del Monte. Because of this shift away from the SC variety, exports declined considerably from a peak of 71,000 MT to 35,000 MT in 2008, especially after 2006 when exports of SC variety pineapples ended. Presently, Ghana has a 4% market share in the sea-freighted exported pineapple market at 45,950 MT on the European market. From the late 1990s to 2005, exports of fresh pineapples from Costa Rica have seen growth from 330,000 MT in the late 1990s to over 900,000 MT presently.

Since 2004, the number of exporters has declined from 50 to 14, with about eight exporting firms responsible for 93% of fresh pineapple exports from Ghana. Smallholders who contributed about 50% to export volumes in the past have not been able to transition to MD2 production and from about 1,600 identified smallholders, Ghana currently has less than 200 smallholders engaged in commercial production of pineapples. As a result of the growth in the sector from 1999 to 2004, a number of processing firms engaged in juice production sprung up to take advantage of pineapples rejected for exports. With the exception of Blue Skies® who are engaged in fresh cut fruit and have seen their annual volumes grow from 1,000 MT to 3,000 MT presently, most of the processing factories are not operating due to lack of pineapples for processing.

Though volumes for fresh pineapple exports have declined, the drop in volume is not commensurate with the drop in value. This is because the industry is not selling its fruit on a consignment basis (which is based on prices prevailing at wholesale markets at arrival) but rather on minimum guarantee prices and sales to supermarkets as a result of improved post-harvest facilities. This notwithstanding, most firms engaged in the production and export of fresh pineapples in Ghana are less competitive than their

counterparts in Costa Rica: Ghana has 20% gross margin of turnover compared to Costa Rica which has 49% gross margin of turnover and 6 times more revenue per hectare than Ghana in the conventional market. Many local Ghanaian firms have very low profitability and extremely tight cash flow as a result of:

1 Low prices per kilo between 2004 and 2006 due to exporting stocks of SC in a limited market. This resulted in huge losses and accrued interest payments on existing loans.
2. Low export receipts due to low volumes of MD2 exported from 2006 to 2008 because of the delay in shifting production from SC to MD2.
3. Huge capital outlay in new infrastructure, new production planning, equipment, and instituting new systems in response to production of MD2.

Most of the firms that survived the transition from SC to MD2 had acquired Fair trade certification, which allowed about 20% of their fresh export volumes access to the fair trade market with a 20% premium price higher than selling under conventional markets.

Under the Cotonou Agreement, Ghana was allowed to export most of their goods, including fresh produce, to the EU duty-free on a non-reciprocal basis. This Agreement expired at the end of 2007 and negotiations commenced to develop a new framework—the Economic Partnership Agreement (EPA)—with the Ghanaian Government signalling its intentions to formally sign in the near future. With respect to market barriers, there is no formal legislation in place in the EU.

The key barrier to entering the European market, however, are certification standards imposed by supermarket collective groups, such as the wholesale Global GAP certification, and those imposed by individual supermarkets such as Tesco Nature Choice (TNC) by Tesco, and Field to Fork by Marks & Spencer, etc.

The losers in the pineapple industry have been commercial smallholders who have lost substantial income. For example in 2004, it is estimated that commercial smallholders received about 3.8 million USD from exporters based on their contribution of 35,000 MT to export volumes in that year. Today, most of that revenue is lost as no smallholder farmers produce fresh pineapples for export anymore.

Based on quantitative analysis findings, the market demand shift in Europe from SC to MD2 pineapples, which peaked in 2005, has had a negative impact on pineapple exports from Ghana well beyond 2005. Firms that converted production from SC to MD2 pineapples early, acquired post-harvest infrastructure, maintained their export share, and had a heterogeneous impact on export volumes. The number of workers had a positive relationship with export share of the firms and was very significant at the 1% level. The period of conversion to MD2 pineapples had a positive correlation with firm's export shares, significantly at the 1% level.

The problems faced by industry are not access to markets, but rather challenges to production, productivity, and response to market shifts, and transitioning to new varieties of the product. Addressing these challenges will provide a platform for commercial smallholders to participate in the chain and most importantly, strengthen the supply chain for the existing processing firms established within the horticultural enclave in Ghana.

Acronyms

ACP	African Caribbean Pacific
AEL	African Express Line
AgSSIP	Agricultural Services Sub-Sector Investment Program
EDAIF	Export Development and Agricultural Investment Fund
EPA	Economic Partnership Agreement
EU	European Union
GAEC	Ghana Atomic Energy Commission
GCNET	Ghana Community Network Services Limited
GEPA	Ghana Export Promotion Authority
GEPC	Ghana Export Promotion Council
GFZB	Ghana Free Zone Board
GLOBAL GAP	Global Good Agricultural Practices
GPHA	Ghana Ports and Harbours Authority
GPRS	Growth Poverty Reduction Strategy
GSGDA	Ghana Shared Growth Development Agenda
HAG	Horticulturists Association of Ghana
HEII	Horticulture Export Industry Initiative
MCA	Millennium Challenge Account
MoFA	Ministry of Food & Agriculture
MoTI	Ministry of Trade and Industry
MT	Metric Tonnes
NTE	None Traditional Export
SC	Smooth Cayenne
SPEG	Sea-Freight Pineapple Exporters of Ghana
TIP	Trade Investment Program
TIRP	Trade Investment Reform Program
TNC	Tesco Nature Choice
USAID	United States Agency for International Development

1. INTRODUCTION

1.1 Background

Like many other food industries in West Africa, Ghana's pineapple industry rose to the hope of expanding exports of processed food to acquire a footing in the international markets. Value of fruits and vegetable contribution to Ghana's export increased significantly from the early 1990s and reached its peak at more than US$30 million in the mid 2000's. It is known that the pineapple industry, from plantation and collection, to processing and export, employed small-scale farmers and poor workers. The success of the pineapple industry had been touted in the past as an example of how a strong and direct link between the producers and processors in the fruits and vegetable market is a tool to reduce poverty and create employment.

However, Ghana's pineapple industry is now in the midst of an unprecedented crisis. One of the problems facing the industry is that the pineapple market and processors require flexibility to the frequent changes in variety of the pineapple fruits demanded, while local pineapple planters are often unable to switch rapidly from one variety to another. This lack of flexibility is due to low technological adoption and poor agricultural extension. Recently, the processors/exporters wanted to process the variety MD2 (a South American variety) but farmers have still stuck with the variety Smooth Cayenne. The mismatch between which variety of pineapple processors actually want and what producers can rapidly offer has shrunk the industry's profit. Many processors and growers have already gone out of business, and the few that survive have attempted to re-organize but faced continuing and steep competition with other suppliers from the rest of West Africa and especially from Latin America.

These challenges have led to the government's decision to encourage remaining processors to focus on the domestic market and foreign low-end market niches and to the introduction of measures enabling farmers to increase productivity and be flexible to market requirements. How these challenges and official policy responses have affected the organization and the decision of the industry's farms and firms on resource allocation and sale strategies by farms and firms in the industry remain unclear. The lack of such information on the size and distribution of trade impacts limits policy makers' ability to formulate trade policies consistent with their development objectives to avoid the collapse of the pineapple industry.

1.2 Objective

The objective of this report is to determine, analyze and establish the level and distribution of trade impacts (benefits or losses) for firms and farmers engaged in the production and export of fresh pineapple from Ghana. To achieve this objective, interviews of firms and farmers were conducted, as well as desk research and data collected on the following:

(a) The structure/organization of the fresh pineapple export sector in Ghana:

a. Identify the size of the pineapple export industry (in comparison with other agricultural exports); sources of the export ability of the industry (regulations, comparative advantage, or abundance in factor endowment);
b. Identify exporting firms; their input and output markets; degree of integration; input sources; market destinations; market shares;

c. Determine the level of industry concentration; level of competition among firms; level of market power;
d. Investigate the presence of market power and especially the sources of market power (regulations, proximity, procurement of inputs) for firms.

(b) Determining how the trading environment (policies, trade agreements) affects the pineapple export industry behavior, and especially the exporting firms' behaviour:

a. Perform inventories of current and past policies, including agricultural trade policy (subsidy, taxation, regulations) on domestic market;
b. Identify policy bottlenecks and barriers in foreign markets and document how these constraints affect firms' behaviour;
c. Investigate the link between exporting firms and their clients (importers) including the bargaining power between exporters and importers; investigate how changing pineapple export demand affects the behavior of Ghana's pineapple producers and exporters;
d. Document past experiences, if any, when the exporters' strategies worked effectively, enhanced trade gains for exporting firms and influenced the distribution of trade benefits.

(c) Collect data on selected and key indicators of exporting firms to establish whether they are determinants to achieve positive trade benefits.

a. Export Performance of selected firms
b. Firm's legal status (Registered or not)
c. Number of workers
d. Wages of workers (Average salaries)
e. Association membership (SPEG or any other association)
f. Free Zone Board membership
g. Access to finance (from EDIF or any other)
h. Size of pineapple cultivated land
i. Type of pineapple variety cultivated (MD2 or any other)
j. Irrigation facility or rain fed farming
k. Type of exporter (fair-trade, organic, etc.)

1.3 Approach and methodology

Literature Review: This involved extensive desktop research and review of various reports on the pineapple sector in Ghana funded by Donors, Non-Governmental Organizations, the Private Sector, and the Government of Ghana.

Qualitative and Quantitative Analysis: In order to establish the impact of trade on selected pineapple firms in Ghana, the aims were to look at the impact of conversion to MD2, controlling for characteristic variables (such as firm size, and age of the firm) on firms' export volumes and hence their market shares. Three models are tested. (i) The difference-in-difference model shows the impact of conversion to MD2 on firms' export volumes; (ii) the Chow's test for structural change is used to establish whether there has been a structural change in pineapple exports after the 2005 shock; and (iii) a final model tests the determinants of export, export per worker, export share, and capital intensity among pineapple firms in Ghana. **Consultations/ Interviews/ Field Visits:** As a follow up to the desk review, consultations, interviews and field visits were held with key players involved in the sector, which are detailed in Table 1.

Table 1. List of interviewees

Function	Actors	Issues for discussions
Exporters/Farms[1]	• Greenspan Farms Ltd • Chartered Impex Ltd • Koranco Farms Ltd • Bomarts Farms Ltd • Golden Exotics Ltd • Jei River Farms	• Number of workers • Land size • Infrastructure • Production performance • Export performance • Turnover • Profitability • Operational Cost • Margin Analysis • Marketing arrangements • Supply arrangements of agric inputs • Detail of outgrower schemes • Policy & regulatory issues
Trade Association	• Sea-Freight Pineapple Exporters of Ghana (SPEG)	• Overview of pineapple sector - Policy - Regulations - Market conditions - Issues affecting sector
Government	• Ministry of Trade and Industry • Ghana Export Promotion Authority • Ministry of Food & Agriculture	• Policy and Regulatory Issues • Support to Industry
Agric Input Companies	• Chemico Ltd • Agrimat Ltd • Wienco Ltd	• Supply arrangements with farms

1.4 Report structure

The report is made up of seven sections including an introduction. Section 2 describes the evolution and development of the pineapple export industry in Ghana. Section 3 describes the structure of the pineapple industry in Ghana. Section 4 presents findings from data analyzed in determining the impact of trade on the pineapple sector. Section 5 discusses policy and trade affecting the pineapple industry in Ghana. Section 6 covers a detailed SWOT analysis of the pineapple industry. Section 7 covers the conclusions of this study, policy recommendations, and areas of future research.

[1] There are currently fourteen exporting farms in Ghana

2. EVOLUTION OF THE PINEAPPLE EXPORT INDUSTRY IN GHANA

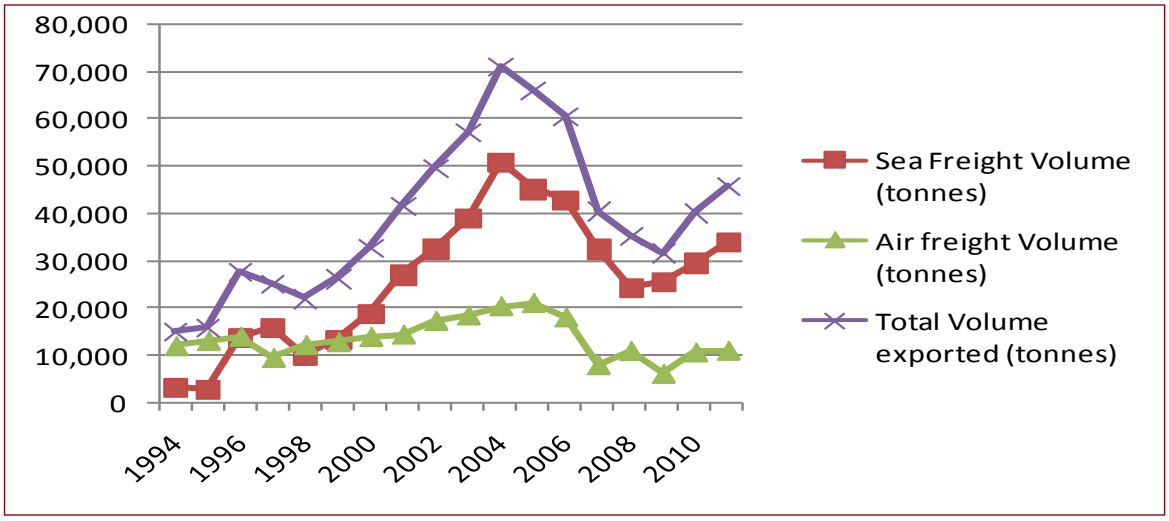
Ghanaian firms began exporting the Smooth Cayenne variety of fresh pineapple to Europe - which was and still is the major destination - by air in very small quantities in the mid 1980s by sourcing from smallholder farmers in the Akuapim South District in Ghana. These smallholder farmers initially supplied the Nsawam Canneries Ltd, a Government owned fruit processing firm engaged in canning pineapple juice for the local and export markets. The early 1980s saw the development of commercial indigenous farms by Ghanaian entrepreneurs from diverse professional and business backgrounds.

The production of these commercial farms was principally to complement purchases from the smallholder farmers and focused on the Smooth Cayenne variety of pineapple, though the Sugar Loaf variety of pineapple existed but was only grown in small quantities in the Central Region of the country for local consumption. The Queen variety of pineapple was also introduced to Ghana in 1999 by Jei River Farms but, like the Sugar Loaf, was also very limited in production to a few commercial farmers having very limited market opportunities in Europe. Some of these farms were Combined Farmers Ltd located near Obodan in the Akuapim South District (which in the 1980s and early 1990s was the largest producer and exporter of fresh pineapple in Ghana) and Jei River Farms Ltd at Ofaakor in the Awutu Effutu Senya District.

2.1 Development of pineapple export in Ghana

The export industry developed because commercial cargo airplanes were in the practice of delivering part accessories to the oil fields in Nigeria, and then flying northbound to Europe empty. This offered the opportunity for fresh pineapple exporters – led by Combined Farmers Ltd, Koranco Farms Ltd and Farmex Ltd – to establish freight companies and charter cargo planes.

Figure 1. Export volumes of sea and air-freighted Pineapples from Ghana (1994 – 2011)



Source: SPEG

Market Share: Ghana has, over the period, been the largest exporter of fresh pineapple by air due to this distinct advantage. The industry experienced growth from 1994 to 2004 especially from 1999 to 2004 at a cumulative annual growth rate of 172%. This resulted in increased market share of fresh Ghanaian pineapples in Europe from 7-8% in 1999 to its highest level in 2004 of 10%.

Smallholder Contribution: based on analysis of export data received and contribution of selected exporters and Farmapine GH Ltd from Sea Freight Pineapple Exporters of Ghana (SPEG), it is estimated that smallholder farmers who had formed some degree of relationships with the majority of the exporting firms contributed about 50% of export volumes from Ghana. Sea-freighted pineapples after 1999 contributed more to export volumes from Ghana than air-freighted fresh pineapples, with the Smooth Cayenne pineapple variety being the preferred choice of air-freighted pineapples.

Export Activities: Between 2001 and 2004, average number of exporters was about 50 with about 40% of them not engaged in direct pineapple production but relying on smallholder farmers for supply. Few exporters had established pack houses to clean, pack and palletize fruits for exports against a backdrop of absence of traceability and standards for exports. Most of the fruits purchased from smallholders were packed in fields, with resultant bruising of fruits and damage to cartons. Most of the fresh pineapples shipped by sea were destined for wholesale markets and on a consignment basis. Exporters were not offered a minimum guaranteed price and only received statements of account after sales and receipt of receivables by importers. Fruits shipped by air did attract a high premium price mainly because of the shorter transit time which offered exporters the opportunity to harvest fruits at specified brix[2] and colour demanded by the markets and reached destinations fresh.

Nucleus – Outgrower Relationships: Existing relationships between exporters and outgrowers were loosely defined with the exception of cooperatives of Farmpine Ltd, a marketing company with cooperatives as shareholders, which is detailed below. Some exporters had a core of outgrowers who were provided with production support with prices agreed on before production. More often than not, the exporters were responsible for de-greening fruits, harvesting and packing for exports. Initial payments were effected after harvest and validation of weight, with the balance paid after a minimum of six weeks for sea-freighted pineapples. Growers of fruits purchased for air-freight (unlike the ones for sea-freight) were typically paid in full with minimal delay. Payments were effected after harvesting and validation of weight. Because of lack of infrastructure such as pack houses in production areas and poor post-harvest procedures, the quality of sea-freighted pineapples suffered with values obtained not commensurate with equivalent volumes. A number of factors were critical to Ghana's export performance during that period.

2.2 Factors impacting on Ghana's export performance

The introduction of sea-freight for exports of pineapple in 1994 under the new body Sea-Freight Pineapple Exporters of Ghana (SPEG).

This initiative was developed under the USAID Trade and Investment Program executed by AMEX International, a US based consulting group in close collaboration with some selected members of the Horticulturists' Association of Ghana (HAG), which was at the time the association representing the pineapple sector in Ghana. The introduction of sea-freight culminated in the setting up of the Sea-Freight Pineapple Exporters of Ghana (SPEG) in 1994.

[2] The Brix value measures the percent of sugar solids in a product, providing an approximate measure of sugar content. It gives an indirect estimate of the degree of fruit ripeness.

This association was mandated to coordinate logistics of members, vessels and operators and to liaise with government agencies such as the Ghana Ports and Harbours Authority (GPHA), Ghana Export Promotion Council (GEPC), etc. At the peak of its operations, SPEG had 52 members but currently has 30 members with 14 regular shippers.

The initial members of SPEG were Combined Farmers Ltd, Integral Farms Ltd, John Lawrence Farms, Greentex Farms Ltd and Jei River Farms Ltd who were at the time also members of the Horticulturists' Association of Ghana (HAG). This initiative was introduced due to the cost of airfreight which cost 3.5 times more than sea-freight with the former, limited niche air market and huge potential and opportunities in the European market for sea-freighted fresh pineapples. Currently, airfreight costs 4.5 times more than sea-freight in Ghana.

1. **Donor/Government funded programmes.** A number of programmes were initiated with funding from donors and the Government of Ghana to support the pineapple sector in the 1980s and 1990s.

    - Pineapple Production Expansion program was implemented from 1987 to 1990 by the Ministry of Trade and Industry (MoTI) and the GEPC. The main objectives of the program were to expand production of pineapples for export, provide soft loans and assistance in accessing Smooth Cayenne variety of planting material from Ivory Coast, and technical assistance in production and exports of pineapple from Ghana.

    - Agriculture Diversification Project - Horticulture Development Component implemented from 1991-1999 initially by GEPC, but with responsibility subsequently transferred to the Ministry of Food and Agriculture (MoFA). The project design began in 1988 and was implemented with funding of US$ 16.5 million from the World Bank, IDA credit. The fund was also used to create the Horticulture Unit of MoFA to serve as a project implementation unit.

    - Trade and Investment Programme (TIP): AMEX International implemented TIP from 1993 to 1998 with funding from the USAID. The project was aimed at providing support to individual enterprises engaged in:

        (1) Non-traditional exports such as horticulture ,textiles , value added wood,
        (2) Support to export industry associations,
        (3) Financing support to the industry stakeholders.

    - Trade and Investment Reform Programme - Increased Private Enterprise Performance component (TIRP): TIRP, which was a continuation of the objectives of TIP but with a greater focus on integrating the private sector, was implemented by AMEX International, Technoserve and CARE International from 1998 to 2004 with funding of about $60 million from USAID. The focus on the private sector was intended to increase the capacity of micro-enterprises and to link microenterprises/small farmers into the production-marketing chain for exports.

2. **Demand for pineapple in Europe.** Consumer demand for pineapples in Europe increased from 339 000 MT in 1999 to 526 000 MT[3] at a cumulative annual growth rate of 55% by 2004 which provided the opportunity for increased production and exports from Ghana. This was a result of a decline in production and export in Cote d'Ivoire because of political instability in 1999 and a civil war in 2002.

[3] Eurostat

3. **Blue Skies Ltd.** Blue Skies has been producing fresh fruit products (fresh fruit cut) since 1998 from its factory located near Nsawam in Ghana and in 2004 commenced the production of fresh juice for foreign and local markets. The company started by exporting premium quality freshly cut fruits to supermarkets in Europe, which stimulated demand for fresh pineapples locally. Their initial requirement was estimated at about 3000 MT of Smooth Cayenne variety of pineapple annually. They sourced mainly from smallholder farmers at prices competitive to those being offered by exporters. What this did was to offer greater market access to smallholder farmers and stimulate production of the Smooth Cayenne variety of pineapple. They also sourced fruits from a limited number of commercial farms whose fruits were not exported in large quantities due to aesthetic qualities such as size and colour than brix, internal color and texture.

4. **Farmapine GH Ltd.** The creation of a cooperative-based export company made up of five pineapple cooperatives comprising 450 farmers in the Akuapim South district and two existing small-medium producer-exporter companies (Gabrho Ltd and Kokobin Farms Ltd) took place in 1999. The World Bank through the Ministry of Finance provided a loan of US$1.5 million to the cooperatives as start-up capital, which translated into 80% shares in the company. The assets, markets and expertise of the two producer exporters were valued, and they were given the remaining shares. Management was then recruited to manage the company. Farmapine between the periods of 1999 to 2004 became one of the largest exporters accounting for about 23.5% of fresh pineapple exports from Ghana at its peak of operations and offered cooperatives direct access to markets in Europe. The impact of Farmapine's operations was to create more market access for cooperatives and exporters who did not have farms commenced their own production and reduced their reliance on some of the cooperatives that served the fulcrum of Farmapine's operations.

5. **Fairtrade Certification:** About nine of the exporters are Fairtrade certified (Table 2), which have sustained exporters through obtaining premium prices through the varietal shift on the European market with Golden Exotics Ltd in process of acquiring certification. The exporters who had acquired Fairtrade certification explained that access to that market was a way to compete with exports from Costa Rica into the European market. This is because the Fairtrade[4] market offers a relatively higher price, at about 20%, than the conventional market though it constituted about 15% of export volumes, resulting in overall improved average price per carton[5] of fruit. Additionally, it also made available to workers of these companies a premium of four Euro Cents per kilogram to promote and execute social programs for the benefit of workers and the resident communities.

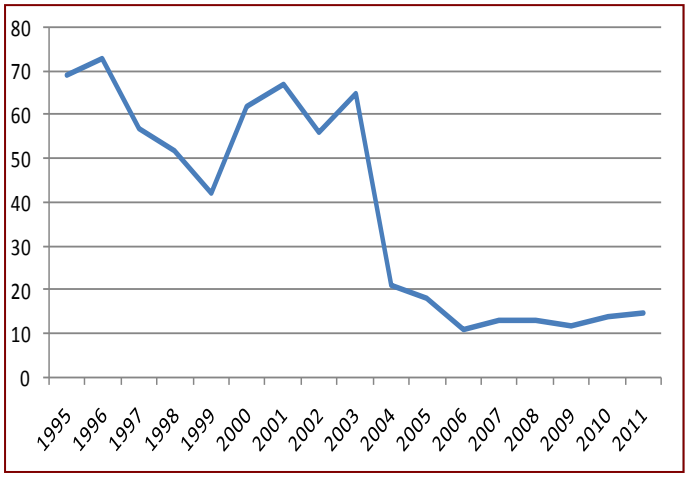
Table 2. Fairtrade Certified Pineapple Exporters

List of exporting firms that are fairtrade certified
Prudent Exports
Milani Ltd
Georgefields Farms
Jei River Farms
Bio Exotica Co. Ltd.
Volta River Estates Ltd.
Bomarts Farms
Gold Coast Fruits

Source: SPEG

[4] www.fairtrade.net
[5] www.average weight of carton is 12 kilos

Figure 2. Number of Fresh Pineapple exporters in Ghana



Source: SPEG

2.3 Decline in fresh pineapple exports

The fresh pineapple export industry since 2004 has, however, experienced declined volume in exports due to a number of reasons, principally due to a shift in market demand in Europe to the MD2 variety of pineapple produced primarily in Costa Rica by Del Monte. Because of this shift in market demand for MD2 (instead of the Smooth Cayenne variety of pineapple), Ghana has seen a decline in the number of exporters from an average of 60 before 2004 to about 14 at present. Though the decline of exports of fresh pineapples started in 2005, it should be pointed out that export of Smooth Cayenne by sea ceased in 2006 and this explains the sharp decline from 2006 to 2007. The reason for the shift in demand can be attributed to the following factors elicited through interviews with buyers and importers of pineapple in Europe.

- During sea-freight, the MD2 variety travels best and is not affected by browning[6] due to low acidity, compared to the Smooth Cayenne variety.
- The shape of the fruit sits well on supermarket shelves and occupies less space as compared to the Smooth Cayenne variety which cannot sit.
- The MD 2 variety has a longer shelf life due to its low acidity coupled with the logistic arrangements of post-harvest handling (usage of packing lines and cooling facilities available in Costa Rica) compared to post-harvest handling of the Smooth Cayenne variety of pineapple in Ghana and Cote d'Ivoire.

2.4 Interventions in response to varietal change

The decline in export volumes was further exacerbated by the delay in response of the industry to market shifts due to the following reasons: The firms exporting the Smooth Cayenne variety of pineapple, were saddled with leftover planting stock and work in progress in the fields did not have enough capital available to invest in true type seed material. The initial cost of suckers and tissue-cultured material was priced at **70** US cents in 2004 to 2006 compared to Smooth Cayenne suckers priced at a mere **three** US cents. In addition, technical knowhow amongst Ghanaian producers both large and small on the agronomy of the MD 2 variety was non-existent. Smallholder farmers, who contributed 50% of export volume of pineapple before 2004 and are no longer in the production of pineapple for exports today, felt the greatest impact of the shift. Interventions were made by donors and Government of Ghana to address availability of MD2 suckers for commercial and smallholder farmers from 2005 to 2007.

[6] Browning or Internal Browning is a physiological disorder that turns the colour of the interior of harvested pineapple fruit into brown and rapidly reaches the core of the fruit. It is caused by several factors including cultural conditions (e.g. varieties, soil acidity and content in minerals), and postharvest treatments (e.g. temperature and duration of storage).

For example, Government of Ghana in 2005 provided a two million dollar grant to the pineapple industry to procure planting material. Other remedial measures were the setting up of Bio Plantlets Ltd, a commercial tissue culture laboratory at the Ghana Atomic Energy Commission (GAEC) funded by USAID. In addition, under the Horticulture Export Industry Initiative (HEII) there was collaboration with a private tissue culture laboratory Bomarts Ltd and Bio Plantlets Ltd to make available tissue-cultured plantlets of MD2 variety to commercial smallholder farmers. Smallholder farmers who had lost incomes due to lack of sales and inability of exporters to pay them due to losses incurred in Europe, were expected to multiply field suckers which required additional capital on their part. This, coupled with their lack of necessary agronomic skills to produce MD2, further compounded the situation.

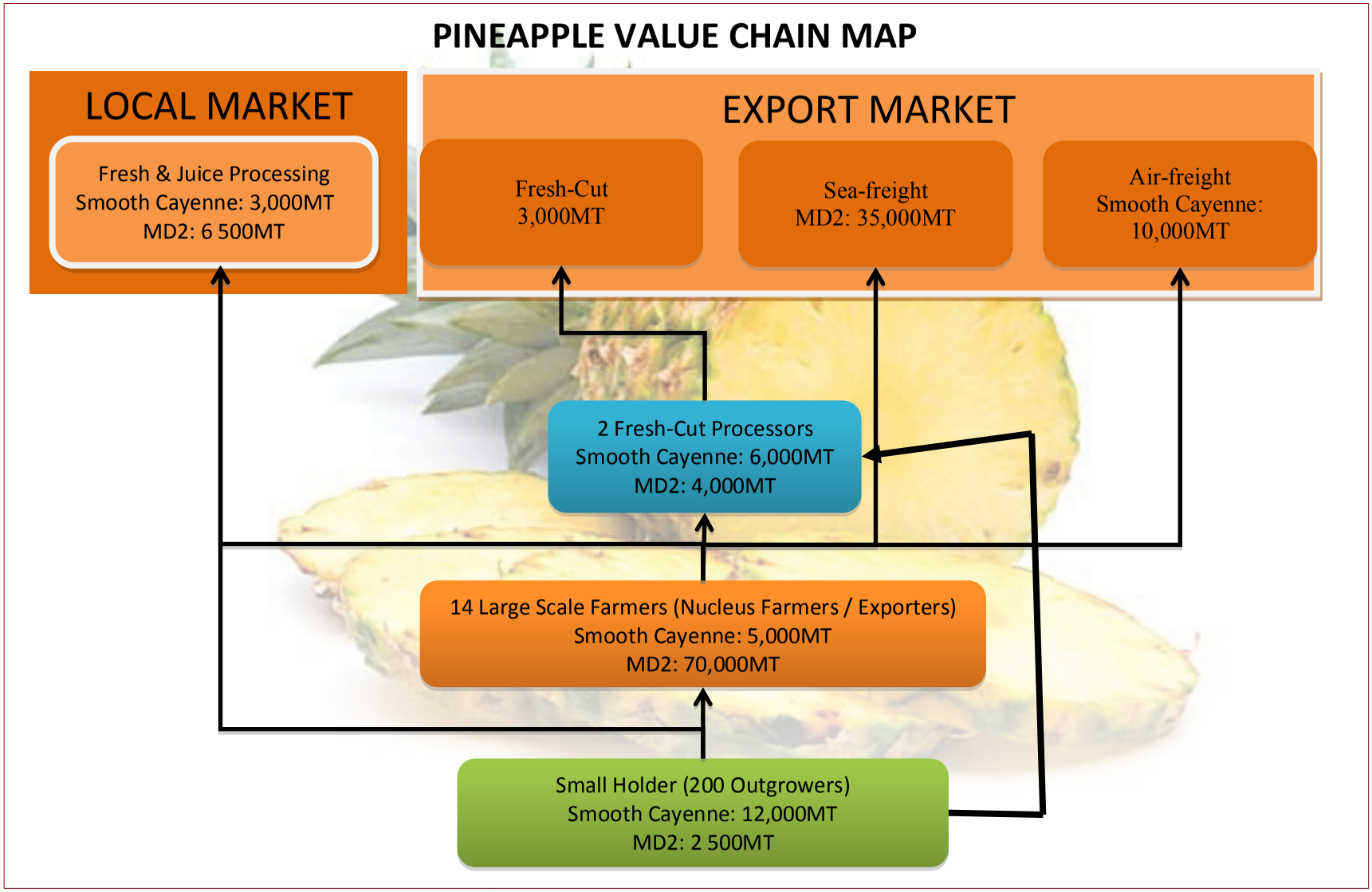
3. STRUCTURE/ORGANIZATION OF THE PINEAPPLE EXPORT INDUSTRY

The pineapple value chain (Figure 3) based on production data for 2011 and current situation in 2012 has a large number of commercial farmers producing about 90% of pineapple in the country currently. MD2 constitutes about 90% of total production in Ghana, with smallholders accounting for about 2% of current production volumes. It is estimated that Ghana currently produces about 70000 MT of MD2 variety of pineapples equivalent to about 5000 acres of production land, based on data collected for exports, interviews with producers/ exporters and visits to their farms and analysis of their planting and production records, Blue Skies and major processing firms. About 50 to 60% are exported by sea with the rest sold to Blue Skies Ltd (6000 MT), Peelco Ltd in Bawjiase, domestic markets, processing firms engaged in juice production such as Pinora and drying firms such as HPW which projects to consume about 2700 MT per annum. Not more than 10% of pineapple production as indicated above is targeted at Smooth Cayenne production, which is limited to a few commercial farms such as Jei River Farms and Unifruit Farms and mostly grown by smallholders. The bulk of Smooth Cayenne variety is exported by air with about 4000 MT sold to Blue Skies. Blue Skies sources its Smooth Cayenne from smallholders (70%) and two other commercial farms - Jei River Farms and Unifruit Farms (30%).

Due to low production of Smooth Cayenne in the country, Blue Skies on a number of occasions have to source from Togo, Benin and Côte D'Ivoire. The conversion rate for processing fresh pineapple to fresh cut is about 26%. It is estimated that smallholder farmers incur a production cost of $1,250/ acre without using mulch and make a return of 70% over a period of 14 months after harvest and sales at 40 Ghanaian pesewas (or US$0.80) a kilogram. Prices offered by exporters and processors vary with respect to the variety of pineapple on offer and from which they export or process into. Blue Skies offers presently to suppliers, 0.40 Ghanaian pesewas per kilo for Smooth Cayenne and 0.20 Euro cents/0.46 Ghanaian pesewas per kilo for MD2. Most of the processing firms that buy pineapple for juice pay 0.26 Ghanaian pesewas (or 0.52 USD) per kilo ex-factory for the two varieties. The bulk of air-freight pineapples are shipped through cargo airlines coordinated by Air Ghana twice a week unlike Blue Skies, which ships everyday on commercial airlines going to Europe. For processed pineapple juice, small-scale firms for local consumption do most processing. Blue Skies Ltd also processes juice for both exports and local consumption. Pinora Ltd is the only company engaged in processing and export of fresh pineapple into juice concentrate and offers $130/MT at farm gate. It has had major challenges in procuring fresh pineapples for processing and so had not had continuous operations for the past four years.

Currently, exports of fresh pineapples from Ghana are done by 14 companies, most of them located in the Awutu Senya District of the Central Region with two – Koranco Farms and Greenspan Farms

Figure 3. Value chain map of fresh Pineapple exports



Source: Authors

Table 3. List of major fresh Pineapple exporters[7]

Exporting firms and contribution to exports of fresh Pineapples	
Bomarts Farms	15%
Georgefields Farms	5%
Gold Coast Fruits	8%
Golden Exotics Ltd	26%
Jei River Farms	12%
Koranco Farms	7%
Milani Ltd	14%
Prudent Farms	6%

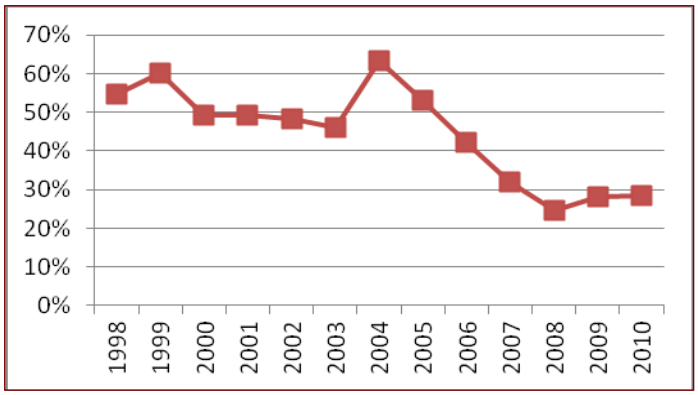
Source: SPEG

– located in the Akuapim South District in the Eastern Region. For fresh cut fruits, Blue Skies based in Nsawam in the Akuapim South District has been the leader (95%) with Peelco Ltd, which operates in Bawjiase in the Awutu Senya district having limited operations. All their products are air-freighted using commercial passenger airlines such as British Airways, KLM, etc with the bulk of Blue Skies products consigned to British supermarkets and Peelco to German supermarkets. Eight key exporters (Table 3) account for about 93% of sea-freighted pineapples as of 2011. Blue Skies, unlike Peelco has an extensive outgrower system in place and are Global GAP certified as a group.

Most of these farms are in the region of 60 kilometres from the main port of Tema. Exports of fresh pineapples are year round with peak exports from October to March. With the exception of Bomarts Farms, Milani Ltd., Gold Coast Fruits Ltd, Georgefields Farms, and Prudent Farms, which have a limited number of outgrowers, all other exporters rely on their own production for export.

Estimates of workers and farmers engaged in primary production of pineapples have been done based on interviews, review of exiting literature and discussion with local consultants who have worked with smallholders under various donor-funded programs. Based on the above and the current program to introduce healthy, disease-free field suckers of Smooth Cayenne variety of pineapple, it is estimated that about 30 large-scale and less than 200 smallholders farmers are currently engaged in commercial pineapple production in Ghana.

Figure 4. Contribution of exported Pineapple volumes to total horticultural volumes in Ghana 1998 - 2010



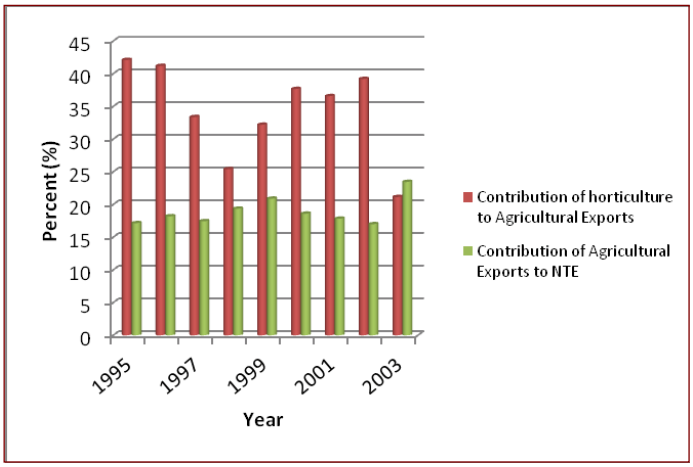
Source: Ghana Export Promotion Authority (GEPA)

3.1 Performance of the pineapple export sector

Prior to the shift in demand from the Smooth Cayenne variety of pineapple to the MD2 variety, the pineapple sector used to be the key contributor of horticultural exports from Ghana. Data obtained from the Ghana Export Promotion Authority indicates a decline in percentage contribution to volume from

[7] Collated from SPEG

Figure 5. Percentage contribution of horticulture to agricultural exports from Ghana



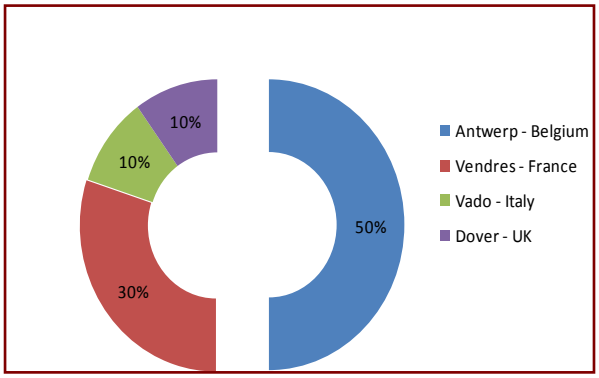
Source: GEPA

60% at its peak in 2004 to about 30% in 2010 notwithstanding an increase of 1,000 to 3,000 MT of cut fruit exports. As pointed out earlier, the juice exports have been very insignificant. This finding indicated the importance of pineapple to the horticultural sector in Ghana during the developmental phase of the sector. Whilst the decline in contribution can be directly linked to varietal shifts, concurrently the exports of bananas by Golden Exotics Ltd further reduces the contribution of pineapples to exported volumes of horticultural producers with banana accounting for seven percent of horticultural exports in 1998 to 46% in 2010. The highest annual volume achieved by the Volta River Estates Limited - a Fairtrade and organic certified banana exporter - is about 5,000 MT, achieved in 2011, and about ten percent of estimated volumes of bananas exported by Golden Exotics Ltd in 2011. Data on monetary values from government agencies are not available due to the lack of instruments or systems to determine prices received for exports and remittances from exports.

3.1.1 Destination of fresh pineapples exports from Ghana

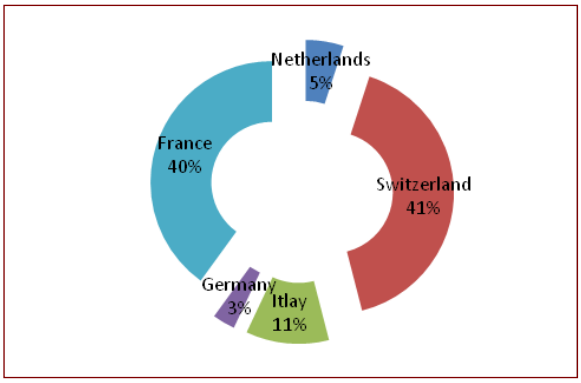
All consignments of fresh pineapples shipped by sea are exported to Europe with HPW AG, the largest based importer of Ghanaian pineapples importing from about five companies accounting for 40.9%. About 20% of the fruits imported are shipped to Britain to high-end supermarkets with the rest shipped to Switzerland and other EU countries. Fruits bound for France are transported by Golden Exotics, which has its corporate offices in Marseille, France. Currently, vessels operated by the African Express Lines (AEL), a subsidiary of COMPAGNIE FRUITIERE, moves most of the fruit shipped by sea. AEL has dedicated fruit vessels with two scheduled port calls per week, making them more attractive than other

Figure 6. Destination ports in Europe receiving sea-freighted Pineapples from Ghana



Source: See Pineapple Exporters of Ghana (SPEG)

Figure 7: Destination of fresh Pineapple exports from Ghana



Source: SPEG

Table 4. Land size and staff strength of current exporters of fresh Pineapples

Company	Staff Strength	Land Size (Ha)
Bio Exotica Ltd.	80	1 000
Bomarts Farms	650	3 000
Chartered Impex	150	2 000
Georgefields Farms	250	2 600
Gold Coast Fruits	210	1 260
Golden Exotics	1 200	6 000
Greenspan Farms	75	750
Jei River Farms	435	5 800
Koranco Farms	230	2 500
Mashaco Farms	45	483
Pioneer Quality Farms	50	400
Prudent Exports	160	2 000
Unifruit Ltd	150	1 800
Volta River Estate Ltd.	100	1 000
TOTAL	3 785	30 593

Source: SPEG

vessels that are open to general cargo and do not operate scheduled port calls. During the peak periods in November to December, the number of port calls is increased to accommodate increased export volumes. SPEG provides logistics coordination services to producers to ensure timely delivery to the port for shipment. AEL makes port calls to four destinations in Europe with about 50% of fruit exported discharged in Antwerp. The cost of freight has, over the past four years, remained steady at US$227 and is currently about US$257 per pallet of 80 cartons. Golden Exotics Ltd has the highest number of farm employees and land size, which is logical when juxtaposed against their being the largest exporters of fresh pineapples from Ghana (Table 4).

Though Jei River Farms has the next largest landholding, it is the fourth largest contributor to exports of fresh pineapples from Ghana. The reason for its large land size is that, unlike most of the Ghanaian and indigenous companies which commenced operations in the 1980s, Jei River Farms Ltd was established by a multinational trading company Société Commerciale de l'OuestAfricain (SCOA) in the 1970s when land accessibility was easy. Critical analysis of export volumes in Ghana by commercial farms in relation to their land size indicate a land utilization rate of 15% for pineapple production and in resonance with long fallow practices seen in Ghana, unlike in Costa Rica.

3.1.2 Computation of values of fresh pineapple exports from Ghana

Values used by government agencies such as Ghana Export Promotion Authority (GEPA) are based on prices quoted by exporters on export forms and fed into the Ghana Community Network Services Limited (GCNet) electronic system for processing trade and customs documents in Ghana. These quoted prices tend to differ significantly from actual export receipts based on the experiences of the authors and interviews conducted with selected exporters. This study has estimated the value of exports of pineapples from Ghana based on a number of assumptions detailed below and in-depth inspection of financial records of some exporters. The considerable experience of the authors of this report in the pineapple export sector as well as lessons learned from managing one of the major exporting firms in Ghana are brought to bear in this study. The assumptions used to estimate the value of exports from Ghana are:

- Current market prices on the basis of minimum guarantee prices to high-end markets: This differs from pricing in the past which was based on sales on consignment and targeted at low-end markets

- Sales of about seven percent of exported pineapples on the Fairtrade market on the basis that nine exporters accounting for 65-70% of export volumes from Ghana are Fairtrade certified: Fairtrade certified pineapples have a 20% premium in price over conventional markets

- Decline in contribution of air-freighted pineapples to overall export volumes but higher prices offered currently than in 2004

It is estimated that the value of exports of fresh pineapples is about US$20 million, from an estimated position of US$23 million in 2004 with an increase in fresh cut fruits from US$5 million to US$17 million. Though the decrease in value of exports of fresh pineapples is expected, the quantum is not commensurate with reduced volumes as of 2011. What this means is not necessarily an increase in profitability, but an increase in export receipts due to access to high-end markets and improved post-harvest management and certifications.

In comparison to Costa Rica, the largest exporter of sea-freight MD2 to Europe, producers in Ghana are not efficient and are operating not more than 55% of their production capacity. Table 5 compares some key indicators in production between Ghana and Costa Rica.

Table 5. Comparison of some production indicators Ghana vs. Costa Rica

Ghana	Costa Rica
• 3 500 cartons per hectare with an average size of 1.4 kilos • Plastic mulch used due to low precipitation • Planting density at 55 000 suckers/ha • Practice of uniformity in selection of field suckers improving • Suckers treated on the field for prevention and control of fun gal and pest infestation due to lack of dipping facilities • Due to lack of equipment, suckers are not planted within 48 hours • Fertilisation done using both knapsack and boom sprayers due to high cost of mechanization	• 7 500 cartons per hectare with an average size of 1.8 kilos • No use of plastic mulch due to high incidence of rain • Planting density at 73 000 suckers/ha • Uniform selection and grading of suckers • Suckers are harvested, treated, and planted within 48 hours. This is done in special dipping tanks at a designated area and transported to field using normal tractor and trailer. • Suckers and slips are used in planting averaging from 150 to 900 grams • Fertilisation and chemical application applied using booms prayers and highly mechanised harvesting activities

Sources: Authors' computation

4. SOME QUANTITATIVE ANALYSES OF TRADE IMPACTS

In order to establish the impact of trade benefits on selected pineapple firms in Ghana, three types of analysis were conducted. The aims were to look at the impact of Year of Conversion to MD2, Firm Size, and Age of the Firm on Firms' Export Volumes and hence their Market Shares. Three Models are tested. The difference-in-difference model shows the impact of conversion to MD2 on firms' export volumes, the Chow's test for structural change is used to establish whether there has been a structural change in pineapple exports after the 2005 shock. A third model used Ordinary Least Square (OLS) to estimate the determinants of export, export per worker, export share, and capital intensity among pineapple firms in Ghana.

Four sets of empirical results are presented below. Firstly, an estimation of the correlations between the different variables of interest is hereby presented. Secondly, an estimate of a dynamic difference-in-differences model to evaluate the impact of the trade shock on firm exports. Thirdly, an ad hoc robustness test by testing for structural change is presented. This is done by empirically verifying if there is evidence that the slope and constant of the export volume regression line are statistically different before and after 2005. Lastly, an evaluation of the determinants of trade by estimating a series of OLS regressions is also done.

4.1 Correlations

Number of workers has a positive relationship with export share of the firms and this is very significant at 1% level. This means that the export share of a firm will increase as the firm increases its number of workers. This may also mean that larger firm (or perhaps more labour intensive firms) may have greater export return. This fact is further reflected in the positive relationship that exists between export share per worker and export share of the individual firms. Period of conversion to MD2 variety of pineapple has a positive correlation with firms' export shares and is significant at 1% level. This means that firms who converted early to MD2 have bigger export shares than those who converted later. This is because

Table 6. Correlations

	Export shares	Adjusted Price	Export Per Worker	No of Workers	Land	Yrs P Harvest	MD2	Age
Export shares	1							
Adjusted Price	-0.4068 (0.0317)	1						
Export Per Worker	0.5564 (0.0252)	-0.5327 (0.0336)	1					
No of Workers	0.8517 (0.00)	-0.2049 (0.3602)	0.4221 (0.1034)	1				
Land	0.8234 (0.00)	-0.3546 (0.1363)	0.2025 (0.4875)	0.8975 (0.00)	1			
Yrs P-Harvest	0.776 (0.0003)	-0.4744 (0.0543)	0.7426 (0.0088)	0.7095 (0.0021)	0.5567 (0.0311)	1		
MD2	0.6103 (0.0026)	-0.7151 (0.0002)	0.7351 (0.0018)	0.3547 (0.1147)	0.487 (0.0345)	0.7927 (0.0001)	1	
Age	-0.09 (0.6621)	0.0618 (0.7644)	-0.2086 (0.4555)	-0.1282 (0.5901)	-0.2569 (0.2883)	-0.1859 (0.4751)	0.1431 (0.536)	1

market demand in Europe after 2005 shifted from SC to MD2 variety of pineapple. Firms that converted late definitely lost market shares as a result of lack of fruits for exports resulting in losing importers to other exporters. The results further show a negative relationship between the year of converting to MD2 and the FOB price of pineapples; this relationship is significant at 1% level. This means that farmers who converted early to the MD2 variety of pineapple obtained higher FOB prices for their pineapples than late converters because they had secured and cemented relationships with importers and importantly, used the period to improve quality of exported fruits to meet market specifications unlike their competitors who converted late. Year of obtaining post-harvest facility shows a positive relationship with export share of individual firms and is significant at 1% level. This finding means that firms who acquired post-harvest facility with installed packing lines and cooling facilities early increased their export shares than firms who acquired post-harvest facility late.

This is because unlike the SC variety of pineapple, the MD2 variety requires cleaning, waxing, sorting (weight and colour) using packing lines and pre and post cooling handling. This minimises bruising, increases shelf life and maintain colour attractiveness for consumers in Europe. Availability of such facility offer firms the opportunity to improve quality of fruits exported over a period and maintain secure importers in Europe.

The age of firm has a negative relationship with export shares of firms and this relationship was also not statistically significant; this means that older firms have smaller export shares than younger firms. This could be attributed to the fact that newer firms established prior to varietal shift did not have huge cultivations of SC variety of pineapple unlike the older firms. This put them in a position to commence production of MD2 variety of pineapple and more importantly, acquire equipment more suited to MD2 production.

4.2 Difference-in-differences

A robust standard error dynamic difference-in-difference model using a year fixed effect model showing the year by year differences is estimated. The model specification used to carry out the analysis is presented in equation (1) below.

$$\mathrm{Y}_t = \beta_0 + \mathrm{B} \times \mathbf{X}_t + \beta_1 \times Export + \beta_2 \times Export \times \mathbf{X}_{t \in [2006,2011]} + \Delta Z_t + \varepsilon_t \quad (1)$$

Y = outcome variables (export volume and export shares)

X = vector of year dummies

Export = 1, if firm is a strictly pineapple export firm and 0 otherwise

Z = Vector of time varying independent variables (Adjusted price, MD2 adopted, Post-Harvest)

Epsilon = error variable

Table 7 presents the results where the dependent variable is the quantity of pineapple exported. The results state that varietal shift from SC to MD2 variety of pineapples which peaked in 2005 has had negative impact on pineapple exports from Ghana well beyond 2005. The relationship between pineapple exports and the independent variable is sensible. While adjusted price has a negative relationship with export quantity, firm converting production from SC to MD2 variety of pineapple and Post-Harvest infrastructure are positively related to exports of pineapple from Ghana.

Table 7. Impact of MD2 shock on export volumes (in pallets)

Variables	Coefficients	Robust S. E.	t	P-value
Export	1705.455***	123.366	13.82	0.000
Export*year$_{2006}$	-892.8609***	117.0119	-7.63	0.000
Export*year$_{2007}$	-351.4997**	138.0467	-2.55	0.026
Export*year$_{2008}$	-635.5918***	209.6132	-3.03	0.010
Export*year$_{2009}$	(omitted)	(omitted)		
Export*year$_{2010}$	(omitted)	(omitted)		
Export*year$_{2011}$	(omitted)	(omitted)		
Adjusted price	-627.5093***	155.6578	-4.03	0.002
MD2 adopted	574.026*	318.9974	1.80	0.097
Post-Harvest	3089.844***	739.0243	4.18	0.001
Constant	810.3751**	294.5835	2.75	0.018
Fixed Effect	Yes			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Further analysis indicates (Table 8) the number of years that firms converted to MD2 has a heterogeneous impact on export volume. For instance, firms that converted to MD2 in 2005 exported 1176 more pallets than firms that did not convert to MD2 in that year. This impact differs by year of adoption such that it becomes 2163, 1208, and 391 pallets in 2006, 2007, and 2008 respectively but loses statistical significance after 2008. This means that conversion to MD2 after 2008 does not significantly enhance export volume. This is because the production cycle of MD2 variety of pineapple is about fifteen months. After fruit harvest, the plant produces field suckers for replanting, over a period of six months. In order to make any significant impact on export volumes, a firm needs to complete three full cycles of production, which is equivalent to a period of about five years. Therefore, any firm that converted to MD2 after 2008, based on the period of analysis will not have any significant impact on its export volumes.

The impact of the shock on export shares (Table 9) is also negative and statistically significant. Incidentally, the impact worsens every year implying that the industry may be on the verge of decline. Export shares of pineapple firms have been declining by an average rate of 26% per year.

In the case of export shares (Table 10), MD2 conversion after 2009 loses its positive impact on export shares. Firms that converted to MD2 between the years of 2006 and 2008 are the only ones who experienced a positive impact on their export shares from trade and this is explained above as a result of period of production cycle.

Table 8. Impact of MD2 shock on export quantities (a deeper look at the effect of MD2 conversion)

Variables	Coefficients	Robust S. E.	t	P-value
Export	1737.427***	143.1349	12.14	0.000
MD2* $year_{2005}$	1176.607***	59.82105	19.67	0.000
MD2* $year_{2006}$	2163.017***	106.2	20.37	0.000
MD2* $year_{2007}$	1208.843***	127.8657	9.45	0.000
MD2* $year_{2008}$	391.8077*	224.711	1.74	0.107
MD2* $year_{2009}$	79.22052	309.0134	0.26	0.802
MD2* $year_{2010}$	-148.0853	382.6423	-0.39	0.706
MD2* $year_{2011}$	(omitted)	(omitted)		
Export*$year_{2006}$	-1613.221***	142.3333	-11.33	0.000
Export*$year_{2007}$	-434.0941**	173.5214	-2.50	0.028
Export*$year_{2008}$	-653.8792***	231.1459	-2.83	0.015
Export*$year_{2009}$	(omitted)	(omitted)		
Export*$year_{2010}$	(omitted)	(omitted)		
Export*$year_{2011}$	(omitted)	(omitted)		
Adjusted price	-658.1494***	138.2472	-4.76	0.000
MD2 Conversion	-191.9983***	59.78368	-3.21	0.007
Post-Harvest	3292.536***	798.5128	4.12	0.001
Constant	919.4139***	252.6136	3.64	0.003
Fixed Effect	Yes			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Impact of MD2 shock on export shares

Variables	Coefficients	Robust S.E.	t	P-value
Export	0.035591***	0.00129	27.59	0.000
Export*$year_{2006}$	-0.0106516***	0.003248	-3.28	0.007
Export*$year_{2007}$	-0.0116738***	0.003174	-3.68	0.003
Export*$year_{2008}$	-0.0160949***	0.003966	-4.06	0.002
Export*$year_{2009}$	-0.0173662**	0.006743	-2.58	0.024
Export*$year_{2010}$	-0.02611***	0.008319	-3.14	0.009
Export*$year_{2011}$	(omitted)	(omitted)		
Adjusted price	-0.0145136***	0.003455	-4.20	0.001
MD2 adopted	0.0113871	0.008247	1.38	0.193
Post-Harvest	0.0985803***	0.023168	4.25	0.001
Constant	0.0249342***	0.007269	3.43	0.005
Fixed Effect	Yes			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. Impact of MD2 shock on export shares (a deeper look at the effect of MD2 Conversion)

Variables	Coefficients	Robust S.E.	t	P-value
Export	0.0365265***	0.00137	26.67	0.000
MD2* $year_{2005}$	0.0325791***	0.002901	11.23	0.000
MD2* $year_{2006}$	0.0580488***	0.003605	16.10	0.000
MD2* $year_{2007}$	0.0397311***	0.00408	9.74	0.000
MD2* $year_{2008}$	0.0242494***	0.005766	4.21	0.001
MD2* $year_{2009}$	0.017975**	0.009215	1.95	0.075
MD2* $year_{2010}$	0.0012945	0.012065	0.11	0.916
MD2* $year_{2011}$	(omitted)	(omitted)		
Export*$year_{2006}$	-0.0272359***	0.001291	-21.10	0.000
Export*$year_{2007}$	-0.0187004***	0.001784	-10.48	0.000
Export*$year_{2008}$	-0.0175595***	0.003592	-4.89	0.000
Export*$year_{2009}$	-0.0213969**	0.009189	-2.33	0.038
Export*$year_{2010}$	-0.0366861***	0.012196	-3.01	0.011
Export*$year_{2011}$	(omitted)	(omitted)		
Adjusted price	-0.0139601***	0.003034	-4.60	0.001
MD2 adopt	-0.0126698***	0.002922	-4.34	0.001
Post-Harvest	0.1023056***	0.024051	4.25	0.001
Constant	0.0259051***	0.005249	4.94	0.000
Fixed Effect	Yes			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Test for structural change

The main test statistic for the structural change test is the Chow test (Tables 11, 12, 13, 14).

For the Chow Test, an interaction term of the regressor "adjusted price" and the dummy variable "year 1" which is equal to 1 if the year of observation is after 2005 and 0 otherwise was created. The coefficient of "year 1" is the deviation of the post 2005 period intercept from the baseline intercept (year 1=0). Likewise, the coefficient of "adjusted price" is the slope of the baseline period, and the coefficient of the interaction terms of "adjusted price" and "year 1" is the deviation of the second period slope from the baseline slope.

The Chow Test is conducted such that the null hypothesis is that two periods have equal parameters for "adjusted price" and intercept; deviations of the slope and intercept are not statistically discernible from zero. Before estimating the Chow Test, the export figures were de-trended to remove potential bias. The results reject the null hypothesis and suggest that there have been a structural change in pineapple export after the 2005 shock.

The three analysis presented in tables 11-14 suggest that the main determinants of export are post-harvest infrastructure, adoption of MD2 variety, fairtrade certification and firm size which is captured by the number of workers. Post-harvest infrastructures, fairtrade, and MD2 adoption are in fact some of the most important determinants of trade and firms that have been using them the longest were observed to be those that traded more.

4.4 Determinants of export, export per worker, export share, and capital intensity

Table 11. Determinants of export per worker

Variables	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Adjusted price	-2.90***	1.23											0.12	1.19
Years with P-Harvest			1.77***	0.53									0.90**	0.42
Years with MD2					1.40***	0.36							0.82***	0.34
Land size							0.002	0.002						
Age of the firm									-0.12	0.15				
Fairtrade											4.52**	1.92		
Constant	12.75***	3.15	2.75**	1.33	-1.90	2.17	5.53***	1.73	8.37***	3.21	3.41**	1.36	-0.38	4.07

* p < 0.10, ** p < 0.05, *** p < 0.01

Tables 12. Determinants of export volume

Variables	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Adjusted price	-1190.76***	504.58													271.43	487.24
Years with P-Harvest			1356.67***	616.68											448.77	298.4
Years with MD2					623.92***	261.62									-121.36	231.73
Land size							4.31***	1.48							-0.62	1.29
Age of the firm									-35.49	104.12						
Number of worker											9.05***	0.52			9.05***	2.46
Fairtrade													1203.48	970.97		
Constant	4713.63***	1855.46	-213	657.62	-1323.92	1046.5	-428.21	659.97	2155.6	2280	-345.61***	180.78	1010.143	794.6431	-781.12	1839.46

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 13. Determinant of export shares

Variables	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Adjusted price	-0.03***	0.01													0.0022	0.0054
Years with P-Harvest			0.04***	0.016											0.012**	0.0059
Years with MD2					0.018***	0.0068									-0.0045	0.0043
Land size							0.00***	0.00							-0.00003	0.00002
Age of the firm									0.00	0.00						
Number of worker											0.0002***	0.000005			0.0003***	0.00005
Fairtrade													0.05*	0.02		
Constant	0.12	0.05	-0.003	0.01	-0.039	0.022	-0.01	0.012	0.056	0.061	-0.006	0.0071	0.02	0.02	0.00019	0.025

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 14. Determinant of capital intensity (Land size/Number of worker)

Variables	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Adjusted price	0.03	0.3									-0.18	0.57
Years with P-Harvest			-0.14	0.15							-0.11	0.27
Years with MD2					-0.14	0.13					-0.08	0.36
Age of the firm							-0.01	0.03			-0.01	0.04
Fairtrade									-0.21	0.47		
Constant	2.49***	0.81	2.9***	0.34	3.30***	0.79	2.85***	0.57	2.67	0.34***	3.97	2.47

* p < 0.10, ** p < 0.05, *** p < 0.01

5. POLICY AND TRADE ENVIRONMENT

5.1 Inventory of trade policies affecting domestic markets

There have been a number of policies designed and implemented by the Government of Ghana over the years with positive impact on the pineapple export sector through the Ministry of Food & Agriculture and Ministry of Trade & Industry. Besides, the pineapple sector since 2001 has accessed and received certification from the Ghana Free Zone Board[8]. Through the above initiatives, the pineapple sector has enjoyed a number of incentives detailed below to improve their competiveness.

These include:

1. Zero Input Duties on Inputs.
2. Zero Value Added Tax (VAT) and National Health Insurance Levy (NHIL) On Inputs.
3. Low Level Corporate Income Tax of 8%.
4. Zero VAT and NHIL on Imported Packaging Material.
5. Zero Import Duties on Farm Machinery.
6. Subsidies on Port Handling Charges between 1994 and 2009.
7. Benefits under Free Zone i.e. Non-Payment of Duties and Levies.

To further support the development and promotion of the export trade, the Government of Ghana established, by Act 582 dated 04 October 2000, a fund – the **Export Development Agriculture and Investment Fund** (EDAIF) – to provide financial resources for exporters in Ghana. The core mission is to finance the development and promotion of Ghana's non-traditional exports on concessionary terms that promote the growth and prosperity of export firms, improve export competitiveness and enable the export sector to contribute towards the economic growth and development of Ghana.

The Fund has two main facilities which can be accessed by applicants for funding, namely the Export Development and Promotion Facility (EDPF) and the Credit Facility (CF).The Credit Facility (loans) can be accessed through Designated Financial Institutions (DFIs) with credit for more than five years. The Export Development and Promotion Facility (EDPF) support activities of groups and institutions in the development and promotion of export products and provision of services to the export sector.

Finally, the industry benefits from the fertiliser subsidy program instituted by the Government of Ghana for the agricultural sector since 2008. Under this program, the government absorbs 35% of the retail price of three types of fertilizers, NPK, Urea and Sulphate of Ammonia used by farmers in the country. Farmers are registered in districts and are issued coupons that are presented to agents of importing firms in their locality to be redeemed by the government agency responsible for the program. The effects of these policies resulted in reducing the cost of production, and freeing up more capital for investment and expansion.

[8] The Ghana Free Zones Board was established Act of parliament in August 1995 and operates under Legislative Instrument 1618 with an objective of promoting economic development and regulate activities of applicants.

5.2 Policy bottlenecks and market barriers affecting exports of pineapples from Ghana

5.2.1 Nature of policy bottlenecks and market barriers

Under the Cotonou Agreement, ACP countries including Ghana are allowed to export most of their goods including fresh produce to the EU duty-free on a non-reciprocal basis. This Agreement expired at the end of 2007 and negotiations commenced to develop a new framework, the Economic Partnership Agreement (EPA). In order to avoid imposition of tariffs, the 27 European countries represented by the European Commission (EC) and Ghana signed the "Stepping Stone" Economic Agreement or the LIGHT EPA in December 2007. Ghana was the second after Côte D'Ivoire to sign the agreement. The LIGHT EPA was to ensure that Ghana continued to export duty-free to the EU until the final EPA was signed. Opportunities for Ghana are varied and depending on comprehensive (homework) planning, Ghana could benefit from the Agreement, which could later lead to a more permanent arrangement i.e. the EPA. There are equal challenges associated with the agreements, particularly the fact that the local economy could be overtaken by events and reduced to a consumer economy if immediate steps are not taken to secure local industries and productivity.

The other advantage is that the agreement is a contract between the two parties and not a preferential treatment. This means it carries with it a greater amount of transparency, security and the predictability of a binding contract. Secondly, it offers the country the reprieve to thoroughly do its homework to enable it become competitive. The Ghana Government is yet to sign the final EPA. In its negotiations, Ghana has to be able to determine the imports from the EU, which contribute significantly to national revenue generation. These items should then be pushed to later years for liberalization. There are also the input items, which serve as raw materials for domestic production. These items could be included in the first batch of items to be zero-rated. Civil society groups particularly the Third World Network, Oxfam and indigenous ones like the Ghana Trade and Livelihoods Coalition (GTLC) have advocated against signing any reciprocal and non-preferential trade agreement between ACP and the EU.

The EU is the principal market for Ghanaian fresh produce exports. The EU is also a significant market for non-traditional exports in general taking an average of between 50% and 60% of total NTEs every year, reaching $2.4 billion in 2011.

With respect to non-tariff barriers, there is no formal legislation in place in the EU. The key barriers are certification standards imposed by supermarkets such as the wholesale GlobalGAP certification and those imposed by individual supermarkets such as Tesco Nature Choice (TNC) by Tesco, Field to Fork by Marks & Spencer, etc which an exporter requires in order to access their shops. Another issue is the lack of a framework to assess quality of exported fruits and the absence of exporters' agent on the market to conduct and verify quality reports.

5.2.2 Effects of policy bottlenecks and market barriers on behaviour of firms

It is worth noting that switching away from the EU market will be extremely difficult not only because of the investments that have already been targeted at the EU, but also because of the difficulty of accessing other markets because of logistical and other challenges and weaknesses. Horticultural exports continue to have free access to the EU market pending the finalization and execution of the EPA. Ghana's pineapple share of about 4% in the EU and efforts are being made to expand the share. Industry disruptions have been avoided since the signing of the Light EPA and the likely signing of the full EPA. The export-led

economic development as reflected in the country's Growth and Poverty Reduction Strategy (GPRS II), and Ghana Shared Growth and Development Agenda (GSGDA), will also not be affected. Information received from the Ministry of Trade and Industry (MOTI) indicates that plans are far advanced for the Ghana Government to sign the EPA and this is welcome news for the horticultural sector.

With respect to the market barriers, the cost for producers and exporters as a result of instituting systems with attendant cost in investment and human resource is quite high but beneficial access to markets. These certifications require annual audits and often go through modifications without full participation of exporters and producers in third world countries. Also, exporters are at the mercy of buyers' quality assessment reports and cannot vouch for their integrity, resulting in lower than expected receipts remitted to them as a result of classification of fruits as poor quality. This greatly affects the revenue base of the firms, resulting in reduced cash flow and reduction in the necessary investment especially in the face of difficulties in varietal shift in response to the market in the EU.

The industry has in response to varietal shift on the market commenced various initiatives, which have brought in its wake synergies to offset the negative impact of this shift under the umbrella of their association SPEG and on individual basis. First, is a joint programme executed and managed by SPEG, which is currently the umbrella body for the pineapple exporters group. It covers various aspects of the industry ranging from production to market-related issues and is often supported by internally generated funds complemented with donor support.

1. Negotiating for freighting services for members with African Express Line (AEL), the main vessel operators responsible for movement of horticultural products by sea. These negotiations are conducted on an annual basis where projections are made and prices agreed to with the vessel operators.

2. Spearheading and coordinating group marketing for members started in March 2012. SPEG identifies buyers and negotiates prices and payment terms. Based on buyers' specifications, a quality control team visits and conducts inspection of farms and pack houses which meet the standards and specifications demanded by the buyers. A common brand has been developed – "Sankofa" – with seven exporters participating. Participating exporters are given a code number for identification. Current markets are Italy, France, Denmark and the UK, with an amount of 1 400 MT shipped as at the end of August 2012. The objective of this program is to promote Ghanaian fresh pineapples and reduce logistic cost in procuring cartons using common branded cartons.

3. Agronomic support through training of their members' personnel, coordination of certification and, in collaboration with MoFA and other research institutions, carrying out joint research on farms of members.

4. Coordinating trucking services to members for the timely conveyance of containerized fruits from farms to the port of Tema, resulting in lower cost than if individual members negotiated on their own. This service was started in 2011 with about ten exporters currently participating in the scheme. Members pay for the services directly to the haulage firm with SPEG providing a guarantee.

5. Coordinating and organizing supply of fertilizer, plastic mulch and packaging cartons for members. This scheme commenced in 2010 procuring original inputs, better pricing and receiving inputs at required times. Payments are currently being made through export receipts from the group marketing schemes. Goods are stocked in designated warehouses of members with an officer designated to manage the scheme.

The second form of support is the promotion of various levels of collaboration between exporting firms covering various aspects of the sector. Collaboration is ongoing on agronomic practices and harmonisation of fertilizer regimes, joint marketing and input support. The industry has seen various collaborations over the years. In 2006 for example, four companies including Bomarts, which was the initial and only source for HPW AG, a large Swiss based importer of horticultural products from Africa and the Far East, formed a marketing relationship with Jei River Farms, Georgefields and Milani Ltd. to supply HPW AG. This involved sourcing uniform cartons with codes representing each of the four companies under a common brand developed earlier between Bomarts Farms Ltd and HPW AG. Inspection and quality programs jointly funded by the four companies with the support of the importer were developed and meetings held jointly to plan export programs through production forecasts and projections.

5.3 Linkage between exporting firms and clients

Unlike the fresh cut fruits exported by Blue Skies, Ghanaian exporters of fresh pineapples shipped on consignment basis, where sales were determined after sales of products on the wholesale market and dependent on the demand and supply situation prevailing at the time of sale. For the past six years, most exporters have been able to access the high end of the market, due to of various standards certifications and improvement of post-harvest infrastructure. This has resulted in bulk sales on a minimum guarantee price basis, which is negotiated between exporters and importers in the EU but which also imposes on exporters, a higher level of professionalism in agreeing on specifications and projection of supply over a longer period.

This has improved the ability of exporters to negotiate with importers in the EU to a certain degree, though it must be pointed out that in terms of preference, most importers offer a better premium to imports from Costa Rica than from Ghana due to the former's consistency in supply, product quality, and export volumes of fresh pineapples.

Despite agreement on a fixed price basis, importers often during periods of supply glut look for reasons to avoid their obligations on prices. This takes the form of raising quality issues, which in periods of demand deficits is not an issue. To overcome this situation, exporters in an effort to strengthen their position have done the following:

- Exporters working individually and under the umbrella of SPEG with a host of importers who are specialised in taking all types of specification vis-à-vis size, color and brix.
- Participating in group marketing to use increased volumes as a leverage to attract major importers who need a critical mass of volume to economize on their infrastructure.
- Improved the quality of their exported products through proper post-harvest management.

Whilst exporters conduct regular meetings with their importers in EU in the form of visits, the Fruit Logistica[9], which is held in Berlin, Germany, remains the major fruit and vegetable trade show in Europe. Most Ghanaian exporters do visit the trade show on an annual basis to engage their importers and have a better understanding of new trends in the industry.

[9] http://www.fruitlogistica.de/en/

5.4 Past experiences of exporters' strategies

One of the key strategies employed by the major exporters of pineapple has been to acquire Fairtrade and other certification. This required large initial investments in infrastructure, trainings, and adherence to compliance criteria such being first buyer at FOB. But at the end, it paid off as it gave exporters access rather exclusive markets. Currently, six of the major fresh pineapple exporters are Fairtrade certified with the largest, Golden Exotics Ltd, in the process of acquiring its certification. This strategy of exporting firms in obtaining and selling fruits under Fairtrade label which has 20% higher prices in comparison to conventional fruits have reduced to an extent, the negative effect on turnover of reduced volumes as a result of the shift of variety from Smooth Cayenne to MD2. All the exporters interviewed during the development of this report during our field visits confirmed this. One major benefit of Fairtrade has been the premium of four euro cents per kilo paid for promoting social programs for workers and those living in their communities. Some of the benefits to workers, their families and friends in the rural areas have been as follows:

- Provision of toilet facilities in their communities.
- Supply of computers and books for schools.
- Credit schemes to assist workers.
- Institution of scholarship schemes to support brilliant but disadvantaged children.

Estimates from 2006 to present indicate a premium of $1 000 000 accrued to workers of Fairtrade certified companies, their families and friends in their communities for their developmental and social programs. Another strategy has been the participation of members of SPEG in joint marketing, which results in savings of five euro cents per carton (compared with sourcing individually). In fact, through SPEG, an umbrella institution, companies were able to negotiate with logistic companies and obtained preferential tariffs and rates.

6. STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS

Identifying Ghana's comparative advantage in the pineapple export sector will require detailed comparison with the largest exporter of fresh pineapples to Europe which is Costa Rica.

As indicated earlier in the report, Ghanaian exporters have since 2004 invested in infrastructure such as pack houses with installed modern packing lines and cooling systems for quality control similar to pack houses in Costa Rica. In addition, agronomic practices have improved reflecting in increased yields of 60 MT per hectare and an exporting yield of 65%, which, though far lower than that for Costa Rica, which is about 120 MT per hectare, has an exporting yield of about 85%. Table 15 summarizes strengths and weaknesses of the pineapple industry and opportunities and threats to the industry. Due to the long history of production, Ghana has developed the relevant human resources to manage the sector demonstrated by the large presence of local entrepreneurs, logistic infrastructure to facilitate production and exports of fresh pineapples. Notwithstanding the strength of the industry, productivity and yields are low in comparison with Costa Rica coupled with adverse external macro environment in Ghana such as high interest rates and lack of long-term capital. Environmental challenges and re-emergence of Cote d'Ivoire and emergence of Nigeria further aggravate this situation. Whilst this is worrying news to the industry in Ghana, the long history of pineapple production in Ghana coupled with importers in Europe to counter balance over dependence on fruits from Latin America will mitigate and provide Ghana the opportunity to take advantage of this evolving situation.

Table 15. Profitability analysis Ghana vs. Costa Rica HA

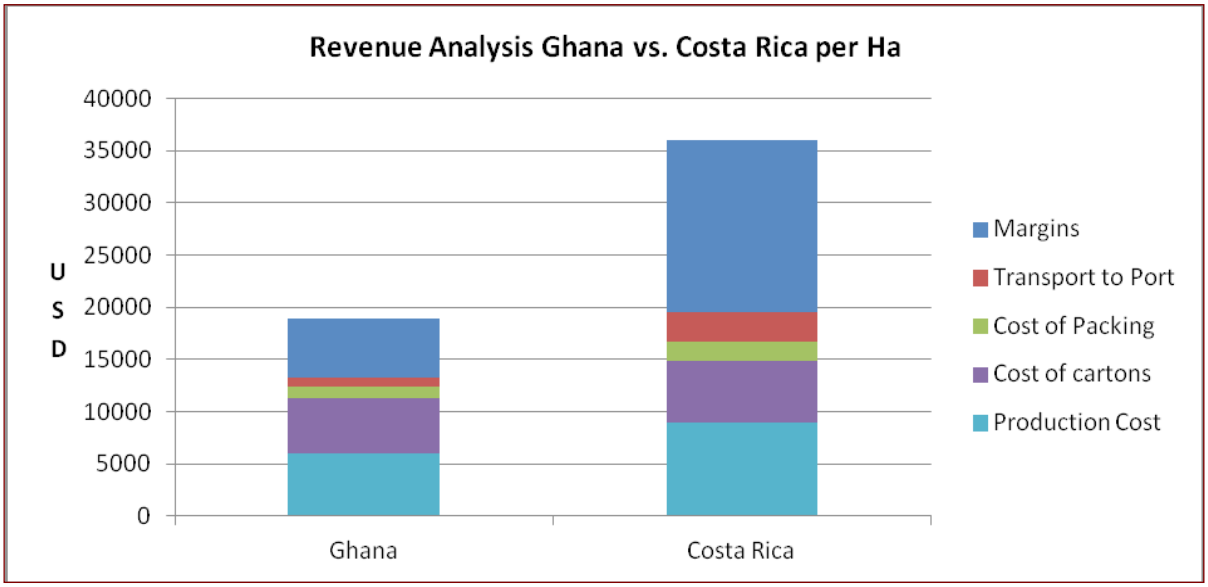


Table 16. SWOT analysis of the pineapple industry in Ghana

Strengths:	Weaknesses:
• Trained workforce with a long tradition of pineapple cultivation • Excellent post harvest facilities on commercial farms and a state of art facility at the Tema port • Very good logistics for transportation available • Presence on the market since the nineteen eighties and a noted leader for air-freighted fresh pineapples.	• Low productivity and yields of producers • Weak financial base of exporting firms resulting in collapse of some which ultimately affect exported volumes and cost of logistics and agricultural inputs due to inability to meet economies of scale • Lack of competitively priced long term capital for expansion in Ghana.
Opportunities:	**Threats:**
• Counter balance and provide importers with a major source of supply to those coming from the south and central America to mitigate risk in the event of disruptions • New market niches in Europe for certified pineapples especially when most of the exporters in Ghana are indigenously owned • Building up productivity to what exist in Costa Rica where producers/exporters have reached their peak in terms of yields and efficiencies.	• Emerging supplies from south and central America and other countries in West Africa , re-emergence of Cote D'Ivoire and new entrants such as Nigeria, Liberia • Issues of weather and rainfall patterns that can affect production of pineapple affecting yields. This calls for huge investments in irrigation with attendant cost • Difficulties of some existing companies which if collapses will reduce market share but also result in cost increase of logistics due to reduced volumes • Possibility of new varieties resulting in varietal shift in demand • The inability of the government of Ghana to sign the EPA resulting in imposition of taxes reducing competitiveness.

Source: Authors

7. CONCLUSIONS AND RECOMMENDATIONS

In 2004, it was estimated that Ghana earned an amount of US$23 million from exports of fresh pineapples to the EU, its major market. In 2011, it is estimated that export receipts has reduced to US$20 million. Based on pre 2004 export performance at annual growth rate of 22%, Ghana was projected to export about 250 000 MT of pineapples by 2011 with an estimated foreign exchange receipt value of about US$100 million.

However the pineapple export sector has been affected by varietal shift in demand in Europe, a shock that had a devastated the industry. Ghana has lost its market share of fresh exports which was 10% in 2004 and 4% in 2011 whilst during the period, imports for fresh pineapples by sea in the EU has increased. Results obtained from data analyzed indicated that varietal shift from SC to MD2 variety of pineapples which peaked in 2005 had negative impact on pineapple exports from Ghana well beyond 2005.

The biggest loser has been the smallholder sector. The shift in demand to MD2 in preference to Smooth Cayenne (SC) variety of pineapple also resulted in the displacement of a great number of smallholder farmers. By 2004, it is estimated that smallholders contributed about 50% to export volumes. Our estimates based on review of the sector through discussions with outgrowers, and other stakeholders indicate a huge reduction in smallholders engaged in commercial pineapple production.

Large-scale commercial sector was largely able to weather the storm. Therefore, size matters for export competitiveness. The number of workers had a positive relationship with export share of the firms and was very significant at 1% level. Responsiveness (flexibility) is also key. Those firms that converted production from SC to MD2 variety of pineapple early, acquired Post-Harvest infrastructure maintained their export share and had a heterogeneous impact on export volumes.

However while size matters, how the firm/farm is organized also matters. Farmapine GH Ltd, working with close to 450 smallholders organized under five cooperatives was the model for organizing small-holders farmers into large entities. Based on a price of 11 US cents per pineapple unit offered by Farmapine to its outgrowers, it estimated that its outgrowers between 1999 and 2004 realized direct sales of US$3.1 million. In widening net gains by smallholder, it is estimated that they obtained about US$3.8 million from supplying pineapples to fresh pineapple exporters in just 2004. Under the MCA Program, close to over 1 600 farmers in Akuapim South district were identified and registered as outgrowers formally engaged in the production of pineapples. However Farmpine was unable to withstand the MD2 shock.

It is clear that while the bigger producers have weathered the MD2 shock, they are still very uncompetitive. The productivity of Ghana farms is 60 T/Ha compared to 120 T/Ha for Cost Rica which also enjoys a much higher quality as attested by export yield of 85% compared to 65 % for Ghana.

A strategy that targets high end niche markets is the most viable alternative for the Ghana export sector to overcome the huge disadvantage in productivity. Indeed, the biggest winners have been the niche marketers. Our analysis shows that fairtrade certification has been a key determinant of good export performance and indeed the top six large exporters are fairtrade certified while fresh cut pineapple exporters have seen sales volumes have increased threefold the period after the MD2 shock. The result of better performance of niche marketers has been the fact that fall in receipts of pineapple exports has been less than fall in volumes.

It goes without saying that infrastructure and finance for the sector are critical going forward. Every hour of delay in cooling can lose shelf life by one day in EU (Fould and Gough 2008). Further estimates puts fruits lost due to rough roads at 10%. Some intervention specific to pineapple industry include support in development of cold chains from farm to port. Tax breaks and subsidies on refrigeration equipment is a potential intervention.

More innovative financing models are needed. The current model under Export Development Agricultural and Investment Fund (EDIAF) needs to be re-examined. The model which provides loans to agricultural export sector fails to address the critical market failure that makes bank not lend to agricultural sector in the first place. Under current arrangement EDIAF provides funds at subsidized interest rates (12.5%) but the loans are administered through commercial banks which collect 10% of the interest as fees (leaving 2.5% for EDIAF). However the banks are asked to bear the full risk. Banks are reluctant to lend EDIAF funds as they can lend their own funds at high interest rates which is commensurate with the risk they are taking. Banks thus tend to undersell the EDIAF facility. EDIAF has made the wrong assumption that liquidity is that issue while interviews with banks indicates that banks have cash. The challenge is the risk that comes to lending to the sector and EDIAF should be subsidizing the risk. A rethinking of the funding model so that EDIAF take a more venture capitalist approach is needed.

Going forward, Ghana should adopt a two pronged strategy mainly targeting niche export markets.

7.1 Support large scale commercial farms targeting organic and fairtrade market niches

Ghana should put more effort in supporting the emergence of large scale pineapple growers. It is clear that size and flexibility will continue to matter as the export markets continue to be dominated by a few supermarkets that demand consistent supply and flexibility.

Thus to stay competitive in export markets and be responsive to changing demand, the presence of large diversified multinational fruit companies is needed. Only a few supermarkets and retailers define the market for fruits in Europe. When Tesco, Marks and Spencer, and the other chains in Europe began demanding MD2, the Ghanaian exporters, and the industry as a whole went into a tailspin. Ability to work closely with these chains in defining standards or designing products will be a key success factor for years to come. Therefore highly integrated producers like Del Monte, Dole etc. will continue to define the industry standards forcing small players to continue playing catch up. Their presence helps open markets and also develops export logistics that become available to industry as a whole. The Ghana pineapple industry relies on banana export logistics developed by Companie Fruitiere (a subsidiary of dole)[10].

However attracting the larger global fruit companies to set-up shop in Ghana will be an uphill struggle due the difficulty of acquiring an appropriate piece of land that is big enough to attract such concerns. Developing a package of incentives (including needed infrastructure and sophisticated financial sector) that will attract can be politically contentious[11] and costly. This has all the same been done, as the presence of Companie Fruitiere (Golden Exotics) attests, and this path could therefore be pursued. However, this can only be a longer-term strategy.

[10] Note that Golden Exotics, has built the banana export sector from almost nothing (first exports in 2006) to become the one of the leading exports commodity. This is a testimony to the power of integrated global fruits companies. Golden is established by Companie Fruitiere which is 40% owned by Dole.

In the short to medium term, supporting existing commercial farms to become bigger and more competitive in niche markets offered by fairtrade and organic certification seems to be the best strategy going forward. This can be implemented by building capacity in the sector through training, and by support in defraying the huge costs of going through the certification and auditing processes.

The government needs to upgrade the existing standards authority so that they can have the globally recognized credentials for certifying. Export Development Agricultural and Investment Fund (EDIAF) should develop special funding facilities to help firm become certified as organic or fairtrade.

7.2 Support development of fresh cut pineapple exports industry

Perhaps the most dynamic sector in the wake of MD2 crisis was the development of a fresh cut fruits sectors using mostly the SC variety and sourcing from small-scale farmers. This sector has the best chance of keeping smallholders in the export sector.

Therefore, continued help to revamp the small-scale sector is needed. As fresh cut sector can use the SC variety that smallholder sector is conversant in growing, the greater effort will be in building trust between small producers and processors as the past experience that saw many smallholder left without market of SC has created a level of mistrust. There is need for development and enforcement of contract models and some kind of insurance to shield smallholders from opportunistic behaviour of processors. Some farmers claim that when processors have enough fruit they tend to have a higher level of rejection rate of fruit supplied by smallholders so that they do not have to pay. An independent testing and measuring body is needed to guarantee farmers get their due and to reduce mistrust.

Selling fresh fruits to supermarkets chains has very strict and exacting requirements to guarantee product safety. However, interviews with stakeholders indicate that some the challenges facing the sector include:

- Testing and Certification (to sell to European markets)
  - It costs more to get a thermometer certified by Ghana Standards Authority(GSA) than it cost to buy a new thermometer in Europe.
  - GSA collects samples and stores them at room temperature and it takes 21 days to get results, yet the products need to be refrigerated and have a 7 days shelf life.
  - Yearly certification from EU is required which costs about EU 10,000 to bring auditors from Europe. If Ghana Standards Authority can be accredited to international standards, part of this cost can be defrayed. Ghana labelling requirements are higher than European, however, GSA is not very rigorous in testing the packaging containers.
- Logistics
  - Traffic in Accra can cause serious delays; there is potential loss of EU 15,000 if a truck does not get to airport on time (plus cost of unhappy customers). Police escort in case of traffic emergency can help.

[11] There are already complaints that incentives (tax holidays and duty exemptions in imported inputs and equipment) given to attract cocoa processing companies have been too generous and given the benefits they bring.

- There is only one cold room at the airport and this is set at one temperature yet different fruits require different temperature settings for optimum preservation for export. Thus, expansion of cold storage facilities at the airport is needed.

7.3 Limitations and future research

The present analysis sought to evaluate the impact of trade on Ghana pineapple exports. Unlike previous analysis, the present work stands out by its rigorous analysis using firm level data. However, the quality of the data prevented the inclusion of all possible determinants in the analytical model. In fact, the trade impact was estimated by comparing trade outcomes between pineapple exporting and non-exporting firms before and after the year of the trade shock. However, ignoring the extent to which non-exporting firm interact with exporting ones could have undermined the robustness of the analytical results. Some non-exporting firms could be indirectly exporting by supplying pineapples to exporting firms and thus may be victim of second order trade effects. Unfortunately, limited information on the different actors involved in each firms supply chain did not fully reveal these effects.

Second the lack of reliable data on smallholder pineapple farmers involved in exports limited the paper from expanding its trade impact analysis to pineapple producers. The lack of flexibility among smallholder farmers to quickly switch to MD2 has been identified as one of the main reasons behind the collapse of the industry. The data limitation obscures the determinants of this lack of flexibility which could have guided the design of applicable policy deliberations. Also the change in the market structure of exporting firms imposed greater oligopolistic pressures on smallholder farmers who in exchange saw their influence in price determination vanished. In the past farmers had a choice between a large number of exporting firms. But now their bargaining power has dropped along with the reduced number of firms and the data was too weak to capture this effect.

For future research, evaluation of innovative activities that firms do to reduce their vulnerability to trade shocks is important. Innovation and adoption of new technologies are one of the most effective ways to keep a business strong and resilient against shocks. It is therefore important to carefully study these innovative activities and initiatives and measure the extent to which they have helped existing pineapple firms weather the effect of trade shocks and why other firms did not adopt them. For the case of pineapples, all of the exporters now produce their own pineapples and no longer rely on smallholder farmers. Is this an optimal adaptation strategy? What can policy do to allow smallholders to re-enter the export market? These are key questions to be answered.

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