

## Sustaining Agro Processing Industries in Ghana: Does Efficient Supply Chain Management Matter?

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### ABSTRACT

In the last 10 years, Ghana has made considerable progress in the development of its horticulture export industry. Today, the country has the potential to become a world leader of horticulture production, being already a champion in pineapple export. Between 1990 and 2004, pineapple export grew from virtual non-existence to 68,000 tons, becoming Ghana's first horticulture export product. Globally, a lot of ink has been spilt on pineapple supply chain, but little is known about the pineapple supply chain in Ghana. The main objective of the study was to explore the supply chain of the pineapple industry in Ghana and come out with recommendations for improvement. This study adopted exploratory research approach since it sought to find out what was happening and to seek new insight into the supply chain of pineapple in Ghana. The study was conducted using Pinora Ghana limited, one of the leading pineapple production companies in Ghana as the case study. Questionnaire and interview guides were the main instruments used to collect data for analysis; the data was analyzed using simple statistical tables and graphs. It was established from the study that a lot of activities take place among chain actors in the course of achieving customer satisfaction. It was also established that the collaboration among chain actors is not strong enough. The research also revealed that inadequate support from the government, intense competition among industry practitioners, lack of qualified personnel to run the organizations efficiently and effectively and high transportation costs are some of the challenges that the pineapple industry in Ghana faced. The study therefore, recommends a strong collaboration and integration among the various actors of the pineapple supply chain and also a committed central government support to the pineapple industry in Ghana.

**Keywords:** Supply Chain, Maximize Output, Pineapple Industry, Challenges

### INTRODUCTION

Developing countries, especially those in sub-Saharan Africa, rely on a few primary commodities and minerals as their main sources of revenue and foreign exchange. Ghana has relied on cocoa, gold and timber which together have accounted for more than 70% of export earnings. There was an urgent need to diversify Ghana's export base following the persistent decline in the prices of cocoa and gold in the 1980 and 1990s. Attempts to diversify the export base resulted in the promotion of wood, aluminum, marine products and horticultural product; collectively referred to as non-traditional export. (ISSER, 2002 cited Yeboah, 2005). According to Yeboah (2005), there has been a lot of support for pineapple production. Pineapple has become the most important agriculture non-traditional export product, its exports increased from 2,600 metric tons in 1986 to more than 42,000 metric tons in 2002, earning the nation over \$4million. In addition, pineapple production provides employment and income in the pineapple growing regions, offering training programmes to farmers, encouraging them to read and write. It also equips out-growers with independent skills set required for pineapple production. Farmers are also motivated to send their children to school owing to significantly improved income earned from the sale of pineapple fruits. The current structure and organization of the pineapple industry makes it very difficult to realize the full potential of the industry. Yeboah (2005) states that a focus on the examination of the marketing arrangement in Ghana is an area that can help realize the full potential in the industry. Trends et al [2004] identified weaknesses in infrastructural development relating to the industry such as weak transportation, non-existence of cold chain and irregular as well as high overseas expenses.

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## **THEORITICAL FRAMEWORK**

### **Supply Chain**

According to hakanson (1999), supply chain consists of all inter-linked resources and activities needed to create and deliver products and services to customers. A supply chain is the end-to-end processes, vendors, networks and other infrastructure necessary for producing and delivering a final product or service, from suppliers of raw materials to the end- user. Supply chain comprises all the activities associated with the flow and transformation of goods from the raw materials [extraction] stage through to the end-user together with the corresponding information flow (stock and lambert, 2001) The fore-gone definitions are all network. Moreover, there are arcs of the network which represent connections that point to the fact that supply chain can be seen as a network. There exist nodes like suppliers, facilities and warehouses in- between the facilities. above all, materials and information flow along the connecting arcs i.e up and down and supply chain.

### **Historical Perspective of Supply Chain Management**

Before the term supply chain was coined, the term used for management and movement of product and services was logistics. The development of logistics was originally undertaken by the military in ancient times. For example, The Roman legions used a flexible system consisting of supplies, storage depots, and magazines stocked with supplies and arms, superb road systems, mobile repair shops, service corps of engineers and armoires, and extensive coordination and planning. This resulted in an ancient, fast and formidable army that won many battles and conquered much of Europe and Asia, and held for many hundreds of years (Britannica,1994-1999).The vast Roman Empire finally declined, not because it lost control of its empire due to poor logistics, but because of poor decay and despotism (Durant,1994)

### **Supply Chain as a Competitive Advantage**

In the competitive environment of the 1990s, there has been a change in management thinking, resulting in a search for strategies that provide superior value. As a result, the supply chain approach to gaining competitive advantage has moved into the mainstream of business strategies. This approach has its roots from historical military campaigns and more recently from porter's value chain, with its strength on inbound and outbound logistics, and manufacturing operations (porter, 1985). In a discussion on marketing logistics thinking, kotler and Armstrong, (1996) argue that logistics has a major impact on customer satisfaction, success and cost. They stated that, a firm's competitive advantage and success depends on the management of its entire supply chain.

### **Supply Chain Management**

The institute of logistics [1998] claims that supply chain is a sequence of events intended to satisfy a customer. It virtually includes procurement, manufacturing, distribution and waste disposal, together with associated transportation, storage and information technology. A supply chain is that network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer or consumers (cited in lysons & farrington, 2006). It emphasizes supply chains as networks, upstream and downstream activities and coordination of processes and relationships that create value to the customer. Value as defined by porter (1985), (cited in perez & Martinez, 2007) is what buyers are willing to pay. He also proposed the value chain as a tool for identifying ways to create more customers value. The supply chain approach developed from logistics is the process of managing both the movement and the storage of goods and materials from the source to the point of ultimate consumption and the associated information flow [Crompton and Jesspon, 2001]. Logistics essentially is an integrative process that seeks to optimize the customer. \*It is also a planning process and an information based activities. Supply chain therefore is a series of linked suppliers and customers every customer is in turn a supplier to the next downstream organization until a finished product reaches the ultimate end user. It is now being recognized that for the real benefits of the logistics concept to be realized, there is the need to extend the logic of logistics upstream to suppliers and downstream to final customers. This is the concept of supply chain management. Supply chain management is a fundamentally different philosophy of business organization and is based upon the idea of partnership in the market channel on a high degree of linkage between entities in that channel. Traditional models of business organisations were based upon the notion that the interests of individual firms are best

served by maximizing their revenues and minimizing their costs. If these goals were achieved by disadvantaging another entity in the channel, then that was the way it was. Under the supply chain management model the goal is to maximize profit through enhanced competitiveness in the final market –a competitiveness which is achieved by a lower cost to serve, in the shortest time –frame possible. Such goods are only attainable if the chain as a whole is closely coordinated in order that total channel inventory is minimized, bottleneck eliminated, time compressed and quality problems eliminated. This new competition modal suggests that individuals compete not as company against company, but rather as supply chain against supply chain. Thus the successful companies will be those whose supply chains are characterized by cost –effectiveness, quality and speed than those of their competitors.

### **Supply Chain Components**

A Successful Supply Chain Management (SCM) requires a change from managing individual functions to integrating activities into key supply chain processes. The three Primary Components are:

**Information:** A vital component of SCM is to be responsive to the market demand and for the chain to be competitive with others.

**Logistics:** The primary material flow and transformation of activities in the supply chain, e-procurement, design, supply of parts and materials, manufacturing, warehousing and delivering.

**Finance:** The primary finance transaction of a supply chain includes pricing, invoicing, payment, and account transaction within supply chain, among others.

According to Lambert and Cooper (2000) operating an integrated supply chain requires continuous information flow. Advance information technology (IT), which has turned the world into global village through “speed of light” transfer of information, data and files, is a major driver of supply chain integration. Through the internet, a single data file can be accessed simultaneously through spatially distributed entries. Although earlier IT applications were in support of secure and evidential transfers of trading reports, cash and other assets and obligations, the application were eventually extended to logistics management (Russ and Camp 1997; Yusuf et al., 2003). According to Fasanghari et al (2008), the impact of IT on SCM is much larger as it facilitates inter-organisational communication and in turn reduces cycle times and develops collaborative work. It provides opportunities for an organization to expand their markets worldwide and also enhances team work and customer relationship management. Russell and Taylor (2003), indicate that information is the essential link between all supply chain processes and activities, including supply, manufacturing/product, distribution, retailers and customers. He elaborates further that Information Technology allows real-time, on-line communications throughout the supply chain. Seamless flow of physical and non-physical assets amongst companies would lead to pooling synergy and optimization of tangible and intangible assets that are potentially available to the individual companies (kasarda and Rondinelli, 1998;Upton and McAfee 1996). Financing a value chain as well as a supply chain is financing provided to or by a supply chain actor in order to increase supply chain growth and competitiveness. Whether provided by a bank, a buyer or an input supplier, supply chain financing allows firms to operate, to transact with others and to upgrade. Supply chain finance is neither a separate subset of finance, with unique or distinct product, nor is a complex new field (Briefing paper, USAID 2007). Supply chain finance includes a wide range of products .While firms may self-finance at times; producers also receive trader credit in the form of in-kind loans from input providers, and seasonal loans from buyers. Buyers use credit not only to secure future product; in out- grower schemes but they ensure that products meet standards by monitoring the farmer, providing inputs and credit effectively in the process. To manage risk, supply chain participants take advantage of their business relationships as a modified form of collateral, for informal or contractual commitments to deliver future products (Ibid).

### **SUPPLY CHAIN RISKS**

Laysons and Farrington [2006] agree supply chains are vulnerable due to external and internal risks. External risks are those attributed to environment, economic, political and social causes, such as storms, earthquakes, terrorism, strikes, wars, embargoes and computer viruses. Internal risks are those attributable to interactions between organizations in the supply chain. According to them, a Canfield University report identifies five categories of supply chain risk. Firstly lack of ownership due to the

blurring of boundaries between buying and supplying organization arising from factors such as outsourcing and the creation of complicated networks of business relationships with confused lines of responsibilities. Secondly, chaos risk due to mistrust and distorted information throughout the supply chain. An example is the bullwhip effect, in which fluctuations in orders increases as they move upstream from retailers to manufacturers to suppliers. Thirdly, decision risk due to chaos that makes it impossible to make the right decision for every player in the supply chain. Fourthly, JIT relationship risk due to the fact that an enterprise has little capacity or stock in reserve to cater for disruption in the supply chain due to late deliveries, such as transportation break down, inertia risk due to a general lack of responsiveness by customers or suppliers to changing environmental condition and market signal with consequential inability to react to completion moves or market opportunities. To the above may be added supplier base reduction especial single sourcing in which an enterprise is dependent on one supplier; globalization in which advantages of sourcing abroad may be offset by extended lead times, transport difficulties and political events; and acquisition, mergers and similar alliance supply interruption, fluctuations in demand and spikes in commodity prices has now alerted companies to focus on supply chain risk management as a discipline to minimize the bottom-line impact of potential disruptions. From the Canfield report, the researcher believes that supply chain vulnerability is due to five main factors-delays, disruptions, operations, price increases and legislation; and ranking these factors against the occurrence, controls and impact we will be able to identify the factor which most identifies with the vulnerability.

### **Disruption**

Supply chain disruptions are unplanned and unanticipated events that disrupt the normal flow of goods, information and materials within a supply chain and as a consequence expose firms within the supply chain to some degree of vulnerability. Pochard (2003), states that risks that can lead to supply chain disruption are as different as natural catastrophes, strikes, political instability, fires or terrorism. Vulnerability of supply chains to these risks has increased because of modern practices such as lean management and just-in-time inventory. Researchers have identified that many of the key risks factors have developed from pressure to enhance productivity, eliminate waste remove supply chain duplication and drive for cost improvement (Stauffer, 2003). But this list is not comprehensive and we can find many other reasons. For example market has put a lot of pressure on firms to differentiate their products. This has led companies to rely on several third parties and has consequently increased because of the growing complexity of supply networks. Indeed the probability that something happens at a particular node or connection is higher than for a small and simple network. Supply chains that comprise hundreds or even thousands of companies present numerous risks. The inconvenience to firms expecting to ship or receive goods and materials is, however, not the entire story; disruptive events within a supply chain can also significantly hurt the financial bottom line for affected entities in the supply chain. Publicly-traded firms experiencing supply chain disruptions, for example, have reported negative stock market reactions to announcement of such disruptive events, and the magnitude of the decline in market capitalization has been as large as 10 percent. As a matter of fact, Ericsson reported a \$400 million loss because it did not receive chip deliveries from the Philips plant in a timely manner (Ringstrom & Soderpalm 2009).

### **Delays**

Supply chains have a direct impact on a company's profit. As mentioned in the opening section, the average cost of shipping time has been estimated to be approximately 0.5 percent of the value of goods per day. For a company importing \$500 million, an average delay of just one additional day could squander as much as \$2.5million per year from the bottom line [Gerper & Carr 2006]. Another study, by the Boston Consulting Group cited by Gersper & Carr (2006), reports that waiting times at ports are already getting much longer and less predictable. The study, avoiding supply chain shipwrecks; navigating outsourcing's Rock shoals concluded that backlogs at ports and at railroads were all time high in 2005, stating; with freight volumes increasing faster than the ports can handle them, the situation will only become worse.

### **Price Increases**

Price can be defined as the value of a commodity or service measured in terms of the standard monetary unit [lysons & Farrington 2006]. They explained further that when comparing two quotations, price enables us to appraise the relative value offered by each supplier.

Economic theory shows that demand and supply are balanced by the influence of price; the Equilibrium price indicating the point at which demand and supply are equal. A seller's market exists when demand exceeds supply, so the price generally falls. Kotler et al [2002] add that a considerable factor in price increase is cost inflation. Rising cost squeeze profit margins and lead companies to make regular rounds of price increase. In anticipation to further inflation, another factor leading to price increase is over-demand; when a company cannot supply all its customers' needs, it can raise its prices, ration product to customers or both.

### **Operational Risk**

According to Comptroller's handbook (1994)(cited in Young,2001), operational risk is defined as the risk of loss occurring as a result of inadequate systems and control; human error; or management failure. Schwartz and Smith [1997] confirm this by stating that operational risk is the risk of loss arising from human errors, management failure and fraud; or from shortcomings in systems or control. They also state that operational risk management is sometimes seen as a discreet aspect of overall risk management. According to Standard Bank's annual report (1998), it is the breakdown of controls and procedures for efficient functioning of operational risk. It is therefore defined as a potential loss arising from malfunctions in automated systems; failure in internal financial and administrative controls; and not compliant with policies and procedure. It also refers to losses as a result of error, fraud and other criminal activities.

### **Legislation**

Government regulations and compliance is a sticky and complex issue for pharmaceutical supply chain management. There can be many legal requirements to be adept at understanding and ensuring compliance with the applicable statutes and regulations in all of the jurisdictions especially where the pharmacy chain operates an outlet or store (Zhang & al, 2008). A pharmaceutical supply chain is a highly regulated environment requiring extensive data collection and information exchange to ensure a chain of custody and monitoring of various control (Zhan et al, 2008)

## **PERSPECTIVES OF INTERNATIONAL FOOD CHAINS**

There are various dimensions of market-induced innovation through international food supply chains. We recognize four dimensions of innovation through the (international) food supply chain (Trienekens and Willems, 2000):

- The economic dimension is related to efficiency (cost-benefit perspective) and to consumer orientation. Due to changing life-style of westernized consumer the demand for convenient food such as pre-cut fruit, fruit lads and ready-to-eat meals is increasing. Furthermore, consumer concerns regarding animal welfare, environmental issues and social aspects, such as salary, working conditions etc., bring about demand for products related to fair trade, organic production etc. This offers opportunities for companies in developing countries to operate in (international) niche markets. However, the international standards for quality, health and animal welfare may have a negative impact on the competitiveness of these companies.
- The environmental dimension is related to the way production, trade distribution of food is embedded in its (ecological) environment. The integration of developing countries into international chains may exert an extra burden on the environment in these countries, due to for instance de-forestation, increase in mono-cultivation and the increase in pesticides and chemicals usage. Environmental sustainable development can be achieved by supply chain collaboration of companies, for example by recycling of waste packaging materials throughout the chain from consumer to farm and introduction of sustainable food production systems.
- The technological dimension is related to the way technology (product and process technology) can be applied to improve production and distribution of high quality and safe food product. A range of new technologies has been developed over the past decade to improve logistics; increase in the use of ICT to boost quality management in the supply chain, cross-border supply chains can be seen as a vehicle by which new forms of production, (on-farm) technologies, logistics, labour processes and organizational relation and networks are introduced. In this respect, technological standards and systems to guide and control processes and flows of goods and information (such as HACCP tracking and tracing) are increasingly internationalized. Supermarkets in Brazil and Thailand, for example, have initiated TOTAL quality management programmes for perishables like fresh fish, meat and vegetables.

- The social and legal dimension (norms and values) is related to constraints to production, distribution and trade of food and to issues like human well-being, animal welfare and sustainable social- economic development. Unequal power relationships in the chain (e.g. increasing global power of retailers) and trade barriers impact not only the organization of the cross-border supply chain (moving value –adding activities to western countries) but also the division of costs and benefit. In particular, small-scale producers in developing countries are in a disadvantageous position because they have little capital to invest, use traditional techniques, and depend on family labour and lack contact with international market players. As a result of increased competition, these small-scale producers may turn-out as the losers. All the four areas of influence cover food chains from farm to table.

## **CHALLENGES OF THE SUPPLY CHAIN**

According to Hanfied and Nicholas, (199), Logistics professionals will continue to be challenged to manage the movement of products across the supply chain in a timely and cost –effective manner that meets customers’ required service levels. In order to meet this challenge, a supply chain-wide logistics strategy is required, which will be the primary drive for the specific logistics strategy within each of the supply chain member organization. Distribution networks, transportation modes, career management, inventory management, warehousing, order processing, and all other related activities will still have to be addressed. They noted that the scope of the logistics strategy is now the entire supply chain (not just each individual unit in the chain). They argued that it will no longer be necessary or desirable for each supply chain member organization to manage its logistics activities on an independent basis. The main obstacles keeping other firms from realizing benefits from reengineering are top management’s limited understanding of the process, a general resistance to change the persistence of rigid departmental-based organizational structures, and lack of a customer perspective (Kallock, 1994). He said the cost of not reengineering can be high. The source stated that Compaq computer estimates that it lost between \$500 million and \$1 billion in sales in the first 10 months of 1994 because its products were not available when and where customers wanted them. The fresh pineapple production sector comprises thousands of small famers and several large scale – pineapple growers. Even though there are several active associations, the pineapple sub-sector is still not sufficiently organized and streamlined to achieve sufficient organized and benefit of economies of scale and increased negotiation power. The pineapple sub –sector in Ghana will not be able to capitalize on the market opportunities in Europe if the following issues are not addressed; low quality of products, low volume of products, high shipping costs. The last factor, according to the source, makes it difficult to compete with Costa Rica and La Cote d’Ivoire, the two major players in the European market. The market position in Europe is low cost for low quality (SPEG, 2005).

## **THE GHANAIAN PINEAPPLE CHAIN**

The production of vegetable and tropical fruits for export in Ghana is expanding with traditional crops such as cocoa, yam and maize coming under increasing pressure due to low world market prices. Pineapple is now a crop of great importance to Ghana. Producers have come to realize that the production of pineapple for the export market is very profitable. The reasons are that the business generates a fast return of currency (12-15 month’s production cycle). Besides that the pineapple is a relatively easy product to cultivate. Pineapples rank first as Ghana’s most important non-traditional horticultural exports. Pineapple exports from Ghana increased from 15,319 tons in 1994 to 46,319 tons in 2002 with a temporary decrease in 1998-1999 due to drought. Most pineapple is exported to the European countries, with Germany as the most important importing country 30% of total exports (GEPC, 2003) It is difficult to provide the exact number of producers cultivating pineapple in Ghana. The main reason for this is that a large number of producers are located in remote areas and sell their harvest to local middlemen who handle the products from the farm –gate onwards, these producers are invisible for the pineapple export organization [like cooperative] and are therefore not included in statistics. Furthermore, a number of small-scale producers produce pineapple on an irregular basis. Especially, after a year in which the European market prices are high, producers tend to start cultivating pineapple with the hope to benefit from these high prices the following year. Because of this, the number of producers differs each year. It has been noted by the sector that the number of small-scale producers has increased since 1995, as a result of the good market prices in Europe (Trienekens and Williams, 2007). They argue that infrastructure in Ghana is weakly developed; the transportation infrastructure is weak, a cold chain is non-existent and transportation overseas is

irregular and expensive. Nevertheless, the number of pineapple farmers has increased considerably in the last years because of the recognition of international market opportunities by the local producers. They classified the pineapple production system into the following groups;

## **PRODUCERS**

### **Specialized Plantations without Growers**

These large (>500 hectares) farms specialize in pineapple production. Farms are often run by farmer-exporters who have integrated production and export trade in general, specialized plantation have vertically integrated business from the farm to the port. They have direct contact with their customers in Europe, have their own trucks, their own shaded pack houses, thus controlling all the activities necessary for exporting. To meet export market demand, the large farms buy about 45% of the exported pineapple fruit from small farmers (Sarpong, 2002). Large-scale farmers provide input materials, inspection and training to out-growers. Furthermore, they may apply fertilizers and chemicals to the plants of the out-growers and in some cases take care of harvesting. Almost 75% of the total pineapple export volume is exported by these specialized plantations.

### **Medium-Scale (Diversified) Export Farms**

These farms often grow a diversified portfolio of crops; mangoes, papayas, pineapples and vegetables. They export these products themselves to the European market or sell them to the local processing industry which exports the processed products. Farms with less than 500 hectares or less than 90% pineapples are categorized as medium-scale (diversified) export farms.

### **Organized Smallholders**

In 1998, structure of the Ghanaian pineapple business changed. With the support of the World Bank, 178 farmers and two pineapple exporters (namely Gabiho limited and Kokobin Farms) formed a cooperative called Farmapine, the World Bank granted a loan facility to Farmapine which was partly used to purchase and supply inputs to farmers. Through cooperation in exporting they are no longer dependent on other exporters. Farmapine has built a central packing facility for all pineapple exports. Currently, Farmapine has over 200 members all of whom own between 0.5 and 10-15 hectares of farms.

### **Non-Organized Smallholders**

These farmers produce normally for the local market, and occasionally for larger farms when there is sufficient demand. Ghana has hundreds of small pineapple farmers who cultivate up to 4 hectares of land. They have limited access to mechanical equipment and rely on market availability. They have their own inputs and sell to a willing local middleman. However, if they supply on a more regular basis to a larger farmer, we call them out-growers. Out growers are often supplied with seeds and in return promise to sell their crops to the exporter. Sometimes they also receive other inputs or cash in advance but in general there is no written contract, only an oral agreement. The estimated number of non-organized pineapple producing smallholders is 1000.

## **TRANSPORTATION**

We can distinguish between two means of transport from farm to port i.e. privately-owned trucks and contracted trucks. The contracted trucks are mainly operated by one-man business that accepts almost any type of load. The trucks are often in poor condition and they do not have a cooling facility. Privately-owned trucks are mainly used by export farms and by organized smallholders. Most of these trucks are in good condition and some have a cooling facility (Pegge, 2003). Around 95% of the total pineapple export is transported by boat. Due to relatively small scale of the Ghanaian exporters, they are often forced to accept the residual space available on ships and airplanes resulting in delays and extra costs. In this regard, respondents reported a strong increase in transportation costs in the last five years. Lack of cooperation among exporters, inadequate long range planning exacerbates the problem of managing available sea/air freight space (pegge, 2003). There are no longer many traders in Ghana who trade only fruits. Most acquire pineapple farms during the past few years to ensure regular and sufficient supply. The number of exporters has fluctuated between 50 to 70 during the last decade, although just 10 companies accounted for 8% of all exports. These 10 larger exporters are the specialized plantation with out-growers and the cooperative Farmapine. The other exporters in 2002 can be classified as medium scale (diversified) export farms. Figure 3 depicts the structure of the Ghanaian pineapple export chain.

## **PINEAPPLE VARIETIES**

The varieties of pineapple grown on the farm were smooth cayenne. This variety competed on the market with the DeI Monte variety Gold sweet (MD2). Del Monte had done a perfect job in the marketing. All the years they sold MD2, the quality was very good; bright yellow outside and inside, with gold taste, and always available. After the license for this variety expired in 2002, a lot of suppliers from South America and Hawaii started planting MD2. Entering the market in 2003 at the same time, the quality of Ghanaian smooth cayenne had gone down drastically, affecting its reputation in the market. The market was that the smooth cayenne was kicked out of the European market so farmers decided to change their variety from smooth cayenne to MD2. MD2 is a hybrid pineapple variety developed by the Hawaiian pineapple institute. It is currently being promoted in South Africa and some West African countries like Ghana. It is a medium to large cylindrical, square-shouldered fruit, with large flat eyes and an intense orange color. The fruit is high in sugar and ascorbic acid. It is lower in total acid than smooth cayenne. The large smooth cayenne variety is less competitive in European markets than the small MD2 variety.

## **METHODOLOGY**

### **Research Design and Strategy**

This study adopted exploratory research approach since it sought to find out what is happening and to seek new insight into the supply chain of pineapple in Ghana. The research strategy formulated was based on what Ghana seeks to achieve in the pineapple industry. It is concerned with an empirical inquiry that investigates a contemporary phenomenon within its real life context especially when the boundaries between phenomenon and concept are clearly defined. The study also employed a single case study approach and survey strategy to find answers to the research objectives.

### **Research Approach**

A combination of qualitative and quantitative methods was used in this study but the analysis was to a large extent descriptive. The stakeholders of the pineapple industry comprised expert and non-experts. This justified the adoption of both qualitative and quantitative methods in the analysis and interpretation of data. A lot of the responses collected came from the non-experts and had been presented in figures. The objective of the choice of qualitative approach was to gain information from the organization under study and to seek their opinion about the supply chain system of the pineapple fruits in Ghana. The system allowed the researcher to do analysis of responses and explanation building which involved understanding of complexity and detailed analysis to achieve the desired results for the study.

### **Study Population and Sample Size**

The study population was 287 and comprised senior managers and junior staff of Pinora Ghana Ltd located at Asamankese near Nsawam in the pineapple growing areas of the Eastern Region of Ghana. The targeted sample size was one hundred (100). This comprises thirty (30) senior managers, and seventy (70) junior staff from the organization. Based on the nature of the study the sample techniques adopted were purposive and random sampling, however, eighty (80) respondents, representing 80% response rate handed in their questionnaires.

### **Sampling Techniques**

Purposive technique was used to select the senior managers since the researcher assumed that they are professionals and have in-depth knowledge on what constitutes a good supply chain system. On the other hand random sampling was used to select the junior staff who I presumed to be unskilled.

### **Data Collection**

Primary and secondary data sources were employed. This arrangement provided an opportunity for the first-hand information to be compared what exist in literature.

### **Primary Data**

Primary data was collected through interview from respondents. Direct observation was not left out. The study employed questionnaires as its main primary source. A set of questionnaires was administered to employees of Pinora Ghana Ltd and these comprised junior and senior staff. Many open ended questions relating to the research objectives were asked in order to obtain unbridled answers.

### **Primary Data Collection Instrument**

A set of questionnaire was designed and administered and administered to the respondents. Similar questionnaire were developed for all the respondent groups in the sample population. Interviews were sparingly used whenever the need arose.

### **Secondary Data**

Secondary data was collected from various sources for purposes other than the problem at hand This include publications such as books, articles, internet sources and many established facts. The sources related to SCM principles and best practices that could bring improvements in the pineapple fruit industry. Secondary data is enormous saving in resources, time and money.

### **Data Analysis**

The data analysis that was collected through interviews was in note books and transcribed in line with the specific objectives. Questionnaires were administered and checked for correction on completeness and stored for analysis. The data collected from the field was analyzed by using statistical tables and figures. Frequencies and percentages were used to analyze findings where necessary to judge the role of supply chain in the Ghanaian pineapple industry. The various findings were discussed extensively.

### **Company Profile**

Pinora is a German-Ghana venture processing pineapples and oranges into frozen juice concentrates for export. The company is based in Asamankase, to the west of Nsawam in a newly built installation. The company was established by the German juice processor, Blender and Dealer, TWG Trade work GmbH in 2005 in order to secure a supply of pineapple juice. The investment to date is estimated at some 10mn and the company now buys from about 25,000 farmers. South Africa management operates the plant with technical assistance from Brazilian technicians. In the course of setting up, the company realized the potentials of the extensive orange groves in central and western region to provide a feedstock for the factory and have expanded into orange juice. The company buys from a large area from Takoradi and beyond in the west to beyond Kumasi and into Brong Ahafo in the North West. Oranges may be collected or delivered direct but securing transport remains a major bottleneck. Prices are set weekly or monthly, and the General Manager, Kay Jacobs, reports that their prices are now becoming a reference among orange traders. Pinora processed some 30,000 tonnes of oranges in 2007. There is capacity to process almost 30,000 tonnes of pineapples but supply has become a problem: the company cannot secure sufficient smooth Cayenne pineapples and only managed some 5,000 tonnes last year.

## **RESULTS AND DISCUSSION**

### **Background of Respondents**

The respondents were made up of managers and junior staff of the company. In all 30 questionnaires were given to managers and 70 to the junior staff. The distribution of the questionnaire was so calculatedly done such that their views and opinions could find expression and be considered in the overall findings of the researcher and also to ensure a balance of opinion from the respondents. 80 out of 100 questionnaires were answered and received by the researcher. This could be put down to various reasons including lack of interest in the exercise, loss of questionnaire and unavailability of respondents [either travelled or on leave etc.]

Table 4.1 shows the background information of workers who responded to the questionnaire and interview. Out of 80 respondents, only 4% are master degree holders, 25% are first degree holders while 33.5% and 37% are SSSCE and BECE/MSLC graduates respectively. Again on the issue of work schedule or job classification, the data indicate that 7.5% and 5% are managers and accountants/account s officers respectively. Supervisors at various departments/units of the company accounted for 25% of the workforce who responded to the questionnaire for this study. Meanwhile, 20.5% and as much as 42.5% are administrative assistants and labourers respectively.

**Table4.1.**

VARIABLE PERCENTAGE	FREQUENCY	Percentage (%)
	(N=80)	
Educational background		
0 Master	3	4.0
1 First degree	20	25.0
2 SSSCE	27	33.5
3 Basic	30	37.5
Work Schedule		
4 manager	6	7.5
5 accountant	4	5.0
6 supervisor	20	25.0
7 administrative assistants	16	20.0
8 labour/factory hands	34	42.5

**Sources:** *Author's Field Survey, 2011*

### Sources of Pineapple Fruits and Purchase of Organizations Final Product

Table 4.2 shows the data of suppliers of fruits and raw materials to the company as well as those who purchase finished products from the company. The data indicate that 50% of the raw materials supplies to the company come from large scale farmers. The remaining fruits/raw material are supplied by middlemen (18.75%) and small scale farmers (31.25%). The data also indicate that various business groups purchase products from the company. The study shows that 43.75% of the company's products are exported while 31.25% buy in bulk. Some supermarkets and retailers also buy directly from the company.

**Table4.2.** *Sources of pineapple fruits and purchase of final product*

VARIABLE PERCENTAGE	FREQUENCY	Percentage(%)
	(N=80)	
Suppliers of pineapple fruits		
1 farmers	0	0.0
2 middlemen	15	18.75
3 farmers(large holders)	40	50.0
4 farmers(small holders)	25	31.25
Buyers of company's products		
5 exporters	35	43.75
6 retailers	15	18.75
7 supermarkets	5	6.25
8 wholesalers	25	31.25

**Source:** *Authors Field Survey, 2011*

### Dynamics of the Pineapple Supply chain in Ghana

Table 4.3 shows the dynamics of the pineapple supply chain in Ghana. The data shows that access to information flow and other support services are usually not on time, as indicated by 71% of respondents. This gives enough indication that the Ghanaian pineapple supply chain lacks efficient information system. The result also indicates that the company collaborates with its partners in most cases, including farmers, retailers, wholesalers, exporters and other trading partners such as middlemen and supermarkets. Majority of respondents indicated that the company's partners assist the company in its production in quite a number of ways, which include supplying high quality fruits and other raw materials to the company, offering credit facilities and making inputs to the final products produced. Its partners are done manually with less IT usage. This depicts that IT usage The data also shows that most transactions between the company and in the Ghanaian pineapple industry is not given much attention. On the issues of supply of pineapple to the market, 65% indicated that supply all the time includes few producers; farmers easily switch to the production of other fruits, lack of storage facilities and the perishable nature of pineapple fruits. The data also indicate that the production of pineapple is seasonal and is prevalent between August and February.

**Table4.3.** Dynamics of the Pineapple Supply Chain in Ghana

VARIABLE PERCENTAGE	FREQUENCY	
	(N=80)	Percentage(%)
Information and support services from partners		
1 yes	23	28.75
2 no	57	71.25
Company has business partners		
3 yes	50	62.5
4 no	30	37.5
Company has partners who assist production		
5 yes	50	62.5
6 No	30	37.5
Company has ICT facilities to assist partners		
7 yes	30	37.5
8 no	50	62.5
Producers supply enough pineapple to market demand		
9 yes	28	65
10 no	52	35
Partners collaborate and complement each other		
11 yes	35	43.75
12 no	45	56.25
Season within the year when pineapple is available		
13 All year round	15	18.75
14 August-February	28	35.0
15 October-March	5	6.25
16 July-March	15	18.75
17 October-November	0	0.0
18 September-March	17	21.25

**Source:** Author's Field Survey, 2011

### Means of Transport for Carting Products and Availability of Storage Facilities

Table 4.4 shows data of transport and storage infrastructure of the company. The data indicate that the company has its own means of transport to cart products to and from the company. Also, the company, according to the data, uses private transport operates to cart the product. Road transport is identified as the predominant means of transport for the company's products (63%) though road network within the catchment area is only 37% motorable. Because the company also exports to other countries, water transport as well as air transport (though not frequently) are not used.

On the issue of storage of products the data show that company has facilities to preserve its products for future use and also against spoilage. The result indicated that 50% of the products refrigerated, 31% is kept in the company's warehouse.

**Table4.4.** Transport and Availability of Storage Facilities

VARIABLE PERCENTAGE	Frequency	Frequency
	(N=80)	Percentage (%)
Company has its own means of transport to cart products		
1 yes	37	46.25
2 no	43	53.75
Carriage company uses to transport products		
3 vehicle	50	62.5
4 ship	25	31.25
5 train	0	0.0
6 airplane	5	6.25
Company's outsources transport services 3PL		
7 yes	41	51.25
8 no	39	48.75
Road network within the catchment area is good		
9 yes	30	37.5
10 no	50	62.5
Company has storage facilities to preserve fresh pineapples		
11 yes	50	62.5
12 no	30	37.5

Type of storage to preserve fresh pineapples		
13 warehouse	25	31.25
14 canning	14	17.5
15 Refrigeration	40	50.0
16 other	1	1.25

**Source:** *Author's Field Survey, 2011*

### **The Nature and Prevalence of Risk in the Pineapple Supply Chain**

68% of respondents admitted that the company faces some challenges in its operation, which is not peculiar to the study company but the entire pineapple industry. Some of the challenges were given as high interest rates, lack of ready market for products, which sometimes leads to expiry of products, seasonal supply of fruits to mention but a few. The main source of credit to company is given by banks (62.5%) and intermittently, micro finance institutions extend credit facilities to the company. However, government assistance in terms of credit is non-existence; but sometimes receives some assistance in the form of tax rebates and waivers. Aside the company's code, 81% of respondents were not aware of any other legislation governing the pineapple industry. Even the few who acknowledged the existence of other legislations could not give details of such legislation but just to say they are instituted by the Ministry of Agriculture and Ghana Shippers Authority.

**Table4.5.** *The Nature and Prevalence of Risk in the Pineapple Supply Chain*

<b>VARIABLE PERCENTAGE</b>	<b>FREQUENCY ( N=80)</b>	<b>FREQUENCY Percentage (%)</b>
Company encounters difficulties or risks in its operation		
1 Yes	68	85
2 no	12	15
Challenges faced by the company		
3 lack of government support	25	31.25
4 high transport costs	15	18.75
5 intense competition in the market	17	21.25
6 lack of qualified personnel	23	28.75
Company has access to credit facilities		
7 yes	45	56.25
8 no	35	43.75
Sources of credit facility		
9 government	3	3.75
10 susu and savings	2	
11 micro finance	25	
12 banks	50	
Legislation government pineapple industry		
13 yes	15	18.75
14 no	65	81.25

**Source:** *Author's Field Survey, 2011*

### **Factors Affecting Value Added and Competitive Advantage of Pineapple Production**

87.5% of respondents believed that actors in a supply chain have influence on value addition. They further stated that the level of value addition obtained in a supply chain is dependent on the effort of the chain actors. 97% of respondents agree that longer delivery time, (inbound and outbound) in a supply chain hinders value addition in terms of service rendered to customers. The results show that customers cherish on-time delivery of products and services.

**Table4.6.** *Factors that affects Value Added of Pineapple Supply Chain*

<b>VARIABLE</b>	<b>FREQUENCY ( N=80)</b>	<b>PERCENTAGE (%)</b>
Value addition is affected by many actors in a supply chain		
1 strongly disagree	2	2.5
2 disagree	8	10.0
3 agree	25	31.25
4 strongly agree	50	56.25

Longer delivery time in a supply chain hinders value addition		
5 strongly disagree	0	0.0
6 disagree	5	6.25
7 agree	25	31.25
8 strongly agree	50	62.5
Poor or inadequate storage facilities make preservation of products difficult		
9 strongly disagree	3	3.75
10 disagree	12	15.0
11 agree	35	43.75
12 strongly agree	30	37.5
Some Pineapple companies perform better than others		
13 yes	77	69.25
14 no	3	3.75

**Source:** Authors Field Survey, 2011

## **FINDINGS/CONCLUSION**

### **Dynamics of the Supply Chain**

It was established from the study that a lot of activities take place among chain actors in the course of achieving customer satisfaction. The personnel interviewed indicated that they have partners who support their business processes. It was however, established that collaboration among chain actors is not strong enough. Therefore a service such as information does not flow on time. The evidence was found in the inefficient information flow. The results gathered indicated that pineapple fruits are not found in the market throughout the year. The peak period for the abundance of pineapple fruits in the market is August to February. Most of the organizations have their own transport mode for carting goods and services. Those which do not have, outsource their transport services. Vehicles were found to be common with organizations that export their products. The road network to most of the organizations was found to be poor. The storage facilities found in the organizations include refrigerators, canning, bottling, warehousing etc. Financing in the pineapple industry, according to the cases sampled is a big challenge to the organizations. With regard to a legislature for the industry, most people believe that there is a legislative instrument; however, they are not aware of the exact Act.

### **The Nature and Prevalence of Risk in the Pineapple Supply Chain**

There are a lot of challenges and or risks in the pineapple industry. Some of the challenges include the following; first is the lack of support from government. Unlike many other countries in Europe and Asia where the pineapple industry enjoys assistance from government in the form of subsidy, affordable credit, marketing, lower tariff, tax holidays etc., the industry in Ghana does not attract similar support. They are left to struggle on their own {survival of the fittest} Second is the intense competition among industry practitioners. As a result of the big demand and large market for pineapple products both and outside Ghana, many companies have been established to export pineapple.

It was also observed from the study that the industry grapples with the problem of getting a critical mass of qualified personnel to efficiently run the pineapple companies. The industry is quite new and comes with new techniques for doing things, a situation which will require highly qualified personnel with technical skills to be able to cope with the technical operations of the companies. For now, some of them rely on expatriates to operate certain aspects of the business of the organization. For instance, Pinora Ghana Ltd relies on South African management to operate its plant with Brazilian technicians handling the more technical aspects of the company. Another challenge faced by the industry is high transportation cost arising out of poor road network which result in frequent breakdown of vehicles which have to be repaired at greater cost. Cargoes also charge higher fares for carting goods from the factories to the airport due to poor road network as well as high cost of fuel and spare parts. Lack of government support poses a major challenge to the pineapple industry. Accessing credit to finance activities is initiated by the pineapple companies themselves with no or little intervention from government. This has exposed the industry to exploitation by banks and other financial institutions. Also high interest rates charged on loans deter prospective investors. Additionally, there is little or no

linkage between and among chain actors and ICT facilities and this slows down information flows. There is evidence of collapse of companies in the pineapple industry. The reasons behind the collapse of Farm pine and others are not different from the challenges enumerated above. It was however, established that internal factors accounts more for the collapse of companies. The internal factors include among others the following;

- Lack of ICT services to facilitate business processes
- Poor road network for carting products to and from organizations.
- Delay in delivery of products to their destination.
- Ill motivated staff
- Inability of employer to pay their workers well
- Inappropriate government policies which stifle the pineapple industry.

#### **Factors that Affect Value Added and Competitive Advantage in the Pineapple Industry.**

The factors which contribute to value addition and add competitive advantage to companies are stated as follows;

- The commitment level of chain actors to their work.
- The length of time used in serving customers
- The condition of storage facilities in organizations
- The level of performance put up by companies
- Improvement of the supply chain.

#### **CONCLUSION**

It is important to note that supply chain has become relatively stable in the developed countries. Currently, it is rapidly growing and emerging in developing countries like Ghana. Supply Chain management has increasingly become an important business strategy or tool that can assist organizations have a competitive edge over their competitors. The successful management of supply chain can provide significant benefits to companies like Companies Fruitiere, HPW and Bomarts, Wienco, Blue Skies, Pinora, and other similar in the pineapple industry. In order to achieve an efficient supply chain system, organizations should do well to eliminate or reduce the challenges or risks (as captured in 5.1.3) that are associated with the supply chain.

#### **RECOMMENDATIONS**

The following recommendations are made on the basis of the data analysis and major findings;

- The government should make an appropriate policy to support and promote the pineapple industry. This should come in the form of subsidies, low electricity tariff, tax holidays, and improving road network leading to pineapple production centers as well as assisting the industry to have access to affordable credit. Government should assist the industry to have equal and unfettered access to the international market.
- Support and collaboration among chain actors of the supply chain must be strengthened.
- ICT facilities must be aligned with business process and chain partners in order to strengthen and sustain pineapple supply chain.
- Organization should improve upon their value chain as well their products in order to overcome competition from their competitors.
- Employers should recruit qualified personnel and motivate them well to stay with their companies
- The infrastructure system eg road network should be improved upon.
- Investors should be assisted by government to access loan facilities at affordable interest rate.
- Organizations should improve on their distribution network in order to reach out to customers on time

- Finally, the risks inherent in supply chain systems can be mitigated or avoided, this can be achieved by adopting a structured approach to understanding the nature of risk in the whole pineapple supply chain in order to effectively manage it. This would involve detailed analysis of the successes of the various parties and agencies. Presently the researcher could find little evidences of this done.

Consultations should be done on a continuous basis with actors of the total supply chain. Adequate training packages also need to be developed and disseminated to decision-makers within the chain concerning the presence of risk and its mitigation strategies. This would involve strategists, policy makers, procurement bodies/staff and key stakeholders in the pineapple industry.

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