

Appraisal of Logistics Management Issues in the Agro-Food Industry Sector in Ghana

P.-N. T. Johnson¹, S. Nketia² & W. Quaye³

¹ Council for Scientific and Industrial Research, Accra, Ghana

² Food Research Institute, Council for Scientific and Industrial Research, Accra, Ghana

³ Science and Technology Research Institute, Council for Scientific and Industrial Research, Accra, Ghana

Correspondence: W. Quaye, Science and Technology Research Institute, Council for Scientific and Industrial Research, Box CT 519, Accra, Ghana. E-mail: quayewilhemina@yahoo.com

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Abstract

Logistics management in the Agro-food industries involves coordination of all activities in the value-chain of transporting goods and services to local, regional and international consumers. There are a lot of logistics related challenges facing agro-food industries in developing countries despite the fact that efficiency in logistics management contributes significantly to the competitiveness of agro-industries worldwide. This study investigates the existing logistics management practices in 20 selected agro-food enterprises in Ghana. Using in-depth case studies methodology, the paper addresses logistics related issues such as transportation and fleet management, infrastructure and equipment, quality of customer service and order management as well as level of ICT usage. Challenges facing small scale enterprises understudied include capital investment to replace old equipment with new ones, inadequate cold storage facilities and lack of training in logistics management among others. For the medium-large scale enterprises, logistic related challenges include inadequate financial support, high cost of fuel to support power generation, inadequate cold vans and poor road networks. Lessons learnt from the large scale agro-food enterprises understudied include (i) efficient planning of logistics needs by short, medium and long term requirements, (ii) maintaining good relationship with customers (iii) outsourcing of some logistics needs as much as possible, like raw material supplies, transportation services and other inbound needs but had in place systems for quality assurance and safety management and (iv) pre-processing activities close to the raw material source. Interventions in the agro-food industries were then examined for potential solutions to the challenges raised by the agro-food enterprises.

Keywords: agro-food, Ghana, logistics, management

1. Introduction

1.1 Background

Agro-food industrial development is a vital engine of economic growth, particularly for developing economies such as Ghana. Agro-industries deal with supply, processing and distribution of value-added farm products. With its backward and forward linkages, investments in the agro-food industries generate a multiplier effects through its demand for agricultural production as raw materials, demand for inputs and services in the agro-food value chain, employment generation and increasing incomes as well as a major contributor to value-addition and public sector revenues (Parwez, 2014; Mittal, 2007; Kaufman, 2000).

At the regional level, African Agri-business and Agri-food development initiative by Comprehensive Africa Agricultural Development Programme (CAADP) aims at supporting investment programs on value addition to agricultural produce. Under CAADP, the ultimate target is at least 50% increase in processing agricultural raw materials into high value products by 2015. The role of logistics management in achieving this target by ensuring that value addition process delivers the right products, in right quantities and qualities and at the right place and time cannot be overemphasized (Gachora et al., 2014; Shukla & Sharkharia, 2013).

In Ghana, Agriculture plays a central role in economic development, contributing more than a third of the country's GDP. Aiming at MDG 1, Ghana has developed a Medium Term Agriculture Sector Investment Plan (METASIP) that targets growth in agricultural GDP of at least 6% annually for the period 2009-2015. The

METASIP serves as policy implementation guide for intervention strategies outlined in the Food and Agricultural Sector Development Policy (FASDEP II). The Agricultural sector development policy document addresses the issue of promoting Ghanaian produce in both domestic and international markets and targets a 50% increase in the marketed output of smallholders by 2015. Structurally, the Agri-food sector in Ghana has two main domains; traditional and non-traditional agric food subsectors. Traditional agro-food subsector focuses on value addition to (i) food crops like cereals and Root % tuber crops – cassava, millet, maize and sorghum (ii) livestock like cattle, poultry and sheep (iii) Export crops like cocoa, cotton and groundnut (iv) fisheries like catfish and tilapia. The growing non-traditional agric food subsector focuses on value addition to (i) fruits and vegetables like mango, pineapple and shea nuts (ii) semi processes and processed products like cocoa butter, tuna and tomato paste and (iii) aquaculture like fish cultivation and prawn farming.

Ghana's agri-food sector (also sub-Saharan Africa in general) is constrained by several uncertainties caused by poor physical infrastructures such as storage/cooling facilities, roads, telecommunication, ICT and lack of other improved technologies and weak institutional infrastructures such as unfair trade relationships, government support, sanction systems and weak producer and export associations. One of the key elements constraining the development of agro-food industries is the high cost of production, particularly cost of transportation and utilities (Gebresenbet & Bosona, 2012; Clottey et al., 2009; Ruben et al., 2006). Other weak links that have been identified in the literature include poor package materials and package designs, lack of appreciation for positive contribution of cold chain in better quality service delivery, issues relating to pack houses operations, hygiene and food safety as well as poor records keeping and traceability among others (Fellows, 2011; Trienekens & Willems, 2007; Henson & Jaffee, 2006). Lack of efficient solar drying systems for drying processed products and the need for training on HACCP (Hazard Analysis Critical Control Point), as a food safety management system, to ensure consistency in product quality and food safety as well as training in good processing practices, simple dehydration systems and packaging have been suggested.

The term “logistics” has become popular in recent times, carrying aspects of innovative management to the companies and environment that make good use of its real meaning. The concept of logistics is closely associated with the term “Supply Chain Management” (SCM) such that it is frequently confused and mixed up with SCM. Supply Chain Management Approach aims at “Chain Reversal” (Agus, 2011, Folkerts & Koehordt, 1997; Thrope & Bennett, 2004) in which market demand becomes leading in structure and operations of the supply chain and which focuses on renewal and integration of business systems to improve supply chain planning and balance supply and demand across the supply chain (Bowersox & Closs, 1996; Cooper et al., 1997; Lambert & Cooper, 2000). This approach includes major attention to innovative information and communication technology that is the backbone of these integrated chains (Lancioni, 2000; Porter, 2001). The SCM is an “integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model”. It includes all of the logistics management activities as well as manufacturing operations. SCM drives coordination of processes and activities with and across marketing, sales, product design, finance, and information technology.

On the other hand logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management (in case the agro industry takes care of its own fleet), warehousing, materials handling, order fulfilment, logistics network design, inventory management, supply/demand planning and management of third-party logistics services providers. Logistics management is concerned with physical material and information flows from raw material through to the final destination of the finished product. Major emphasis is now placed on the importance of information, physical flows, and reverse logistics – the flow of products and packaging back through the system. Logistics management is one area where improvements in efficiency are known to contribute to the competitiveness of agro-industries worldwide. Logistics management of the agro-food industries concerns the detailed coordination of all activities involved in the value-chain of transporting goods and services to local, regional and international consumers. However, poor logistic systems and management significantly contribute to the poor performance of agro-industries in developing countries especially, in Africa.

From the policy side, the Government of Ghana has an Industrial Policy which covers some strategies to improve the agro-based local raw materials supply, acquisition of modern technology and the deployment of state-of-the-art plant and machinery for agric based industries. In principle, Ghana's Industrial Policy seeks to improve facilities such as efficient electricity and water supply, telecommunications & transport infrastructure as well as ICT for industrial development. Ghana also has a Trade Policy with logistics management component.

This deals with issues concerning airport cargo handling, storage & cold chain and customs clearance. There is also new private-public partnership (PPP) management of warehousing systems to be established and market information systems improved under the Trade Policy. Government of Ghana promotes value addition in fisheries, reduction in post harvest losses of fish by providing cold storage and processing infrastructure as well as facilitates linkages between processors and relevant service providers including access to credit.

As evidenced in the review above, the Government of Ghana has plans aimed towards solving logistics problems in the Agri-food sector in Ghana. However, the relevance of evidence based research that informs policy cannot be overemphasised. Proper documentation on challenges and efforts to alleviate the problems especially at small and medium scale agro processing industries is missing. From the literature review, most studies on logistics were conducted outside Africa and cannot be appropriated to context specific challenges in Africa (Gebresenbet & Bosona, 2012; Ruben et al., 2006; Fellows, 2011). There is a clarion call for more in-depth case studies on Africa countries. This will help gain a better understanding with regards to evidenced based policies and provision of logistics solutions for growth of local agri- food businesses in Africa.

1.2 Study Objectives

The main objective of this study was to conduct an in-depth appraisal on the existing practices, identify logistics related challenges and opportunities in the agro-food industry. Specific objectives include the following:

- (1) To identify the existing logistics management practices in small, medium and large scale agro-food enterprises, and
- (2) To investigate logistic related challenges and opportunities in the agro-food industry.

2. Methodology

The methodological approach used was in two-fold: (1). Primary data collection through in-depth exploratory case studies of the selected firms, interactions with experts and (2). Secondary data collection through the internet, existing policy documents on agri-foods logistics management studies in the agri-food industry in Ghana.

2.1 Data Collection Methods

A comprehensive appraisal of the logistics systems and management was conducted through a survey involving managers of agri-food industries, agricultural officials and other relevant members of private and public sectors so as to gather information on how issues related to logistics and logistics management in Ghana could be addressed. Data collection methods used to generate the requisite information included participatory data collection techniques involving the use of structured questionnaires for one-on-one interviews, the use of checklist for expert interviews, discussions and participant observations (Russel, 2006; Dorussen et al., 2005; Mack & Woodsong, 2005).

The questionnaire design covered key selected variables that are of significance in terms of logistics management. These variables include (1) infrastructure and Equipment, transportation and/or fleet management, (2) quality of customer services and order management and (3) Level of use of ICT within agri-food processing firms.

2.2 Sampling

Firstly, a compilation of registered firms located mainly in Greater Accra and Ashanti Regions was obtained from the Registrar General's Department in Ghana. The Registrar General's Department was the formal source of registered firms in Ghana. Due to the objectives of the study and resource constraints a decision was made to select 20 firms in Greater Accra and the Ashanti Regions of Ghana for the case studies. Although the small sample size may not be a good enough representation of the Ghanaian agro-food industry, this was adequate for in-depth case studies and empirical findings provided a deeper understanding of the sub-sector.

Secondly, the list of registered firms located mainly in the Greater Accra and Ashanti Regions was segmented into small, medium and large scale firms. By Ghana Ministry of Trade and Industry (MOTI) definition, Micro Scale-Enterprises employ up to 5 people and have fixed assets not exceeding the value of \$10000. Small- Scale Enterprises employ between 6-29 people and have fixed assets not exceeding the value of \$100000. Medium Scale Enterprises employ between 30-99 people and have fixed assets not exceeding the value of \$1Million. The Ghana National Board for Small Scale industries (NBSSI) also categories "small enterprises as those which have 29 or less employees and enterprises whose capital investment requirements do not exceed the cedi equivalent of USD100000". In this study the MOTI definition of Enterprise Scale by number of employees and asset value was applied.

Thirdly, sampling interval (k) was obtained by dividing the population size by the required sample size for the case studies. Every k th firm in the sampling frame was selected for case study until the required sample size of 20 firms was obtained. Willingness of participation by firms in the study was critical. Firms initially selected but unwilling to participate in the case studies were replaced using a random design replacement strategy.

Table 1a. Specific information and characteristics of the firms visited

Name of Firm	Legal Status	Product Line
Lam Agent Ltd	Private Limited	Raw materials Semi-finished/processed (intermediate)
MYROC Food processing Company Limited	Private Limited	Raw materials Finished products
The Nsawam Cannery Limited	Private Limited	Finished products
Norpalm Ghana Limited	Private Limited	Semi-finished/processed (intermediate) Finished products
Bluesky Products (GH) Ltd	Partnership	Finished products
Elsa Foods Ltd	Private Limited	Semi-finished/processed (intermediate)
Eden Tree Ltd.	Private Limited	Semi-finished/processed (intermediate)
Alfrupo Ventures (Alla nac fruit processing venture)	Private Limited	Semi-finished/processed (intermediate)
Nkulenu Industries	Private Limited	Finished products
Maslenda Fruit Processing limited	Private Limited	Raw materials Finished products
Kumasi Abattoir Company Ltd	Private Limited	Finished products
Juaben Oil Mills Ltd	Public Limited	Semi-finished/processed (intermediate) Finished products
Movelle Company Ltd	Private Limited	Semi-finished/processed (intermediate) Finished products
Mckeown Catering Services	Private limited	Catering and Finished products
Tiwajo Industry Limited	Private limited	Finished products
O.G Farm (organic green)	Private limited	Raw materials Semi-finished/processed (intermediate)
Pioneer Food Cannery Ltd.	Private limited	Raw materials Finished products
Cocoa Processing Company	Public limited	Raw materials, Semi-finished/processed (intermediate) Finished products
Kpone Lobster Export Company	Private limited	Semi-finished/processed(intermediate)
Neat Food Company	Private limited	Finished products

Table 1b. Specific information and characteristics of the firms visited

Name of Firm	Specific Product	Age of Firm	Personnel
Lam Agent Ltd	Enzymes for animal feed, enzymes and vitamins & minerals for flour mills and oil mills	11-15 years	< 10
MYROC Food processing Company Limited	Bulk Frozen tuna Canned/pourched Tuna	6-10 years	> 25
The Nsawam Cannery Limited	Processed fruits in cans and packs	< 10 years	> 30
Norpalm Ghana Limited	Crude Palm Oil and Palm kernel Oil	> 25 years	> 30
Bluesky Products (GH) Ltd	Minimally processed fresh fruits for export Sell fruit juice locally	11-15 years	> 30
Elsa Foods Ltd	Fufu, Tom brown	16-20 years	20-30
Eden Tree Ltd.	Fresh fruits, herbs and vegetables	11-15 years	> 30
Alfrupo Ventures (Alla nac fruit processing venture)	Pineapple juice, melon pine, mango juice, ginger drink, pineapple+ginger	< 1 year	< 10
Nkulenu Industries	Palm soup base, Palm Drink, orange marmalade, squash pure jam, mixed Orange drink	> 25 years	> 30
Maslenda Fruit Processing limited	Pineapple, orange juice/concentrate	< 1 year	10-20
Kumasi Abattoir Company Ltd	Meat	11-15 years	> 30
Juaben Oil Mills Ltd	Refined vegetable cooking oil and palm kernel oil	> 25 years	> 30
Movelle Company Ltd	Fish and meat products	6-10 years	20-30
Mckeown Catering Services	General Ghanaian Foods	11-15 years	> 30
Tiwajo Industry Limited	Yoghurt and flavoured drinks	1-5 years	< 10
O.G Farm (organic green)	Vegetables	< 1 year	20-30
Pioneer Food Cannery Ltd.	Sea food, fish product, salmon, mackerel, sardines, sea food spreads	More than 25 years	More than 30
Cocoa Processing Company	Semi-finished cocoa products and confectionery products	More than 25 years	More than 30
Kpone Lobster Export Company	Sea foods	11-15 years	More than 30
Neat Food Company	Neat fufu, plantain, cocoyam, yam, Neat kooko	6-10 years	More than 30

2.3 Data Quality and Analysis

To ensure data quality, questionnaires were pre-tested together with enumerators to have a common understanding on how to ask questions and record responses accurately. During data collection there was on the spot cross checking and validation of responses and also through triangulations and further discussions on key issues relating to logistic management with experts (informal discussions with the president of Association of Ghana Industries, officials of MOTI and MoFA). Validation of results was done through critical reflections and constantly looking back and forth between data and analysis for further elaborations. As already discussed, the major emphasis was placed on the importance of information as well as physical flows and customer services.

Primary data obtained from structured questionnaires were cleaned, descriptive information coded when possible and data entered in SPSS version 18 for analysis. The SPSS outputs were exported to Microsoft excel to simplify the analysis and generate outputs for reporting.

2.4 SWOT Analysis

The study explores the strengths, weakness, opportunities and threats of the Agro-food sector in relation to logistics management. The SWOT is a strategic tool that helps one understand better the competitive advantages that can be exploited in the immediate environment and weaknesses that need to be worked at as well as the better managed threats in the external environment while taking advantage of the opportunities.

2.5 Firms Studied

A total of 20 firms made up of small (20%), medium (45%) and large (35%) were covered in this study as indicated in Table 1. Currently, these firms deal with food commodities mainly grains (cereals and oilseeds), fresh foods (fruits and vegetables) and cold stored products such as milk and meat, modern retailers and food services industry. Thus, disaggregating firms covered under this study by types of product/and or services, Cereals & Oils seeds (25%), Fresh Foods & cold stored products (65%), and Food Service industry (10%). The questionnaire covered key variables including Transportation and fleet management, Infrastructure and equipment, Quality of customer service and order management and Level of ICT usage which are crucial to business growth.

3. Results

3.1 Profile of Firms Studied

Figure 1 gives further details on firms visited by specific product types. Types of customers included local (50%), Export and Local (40%) and Export only (10%). In addition to the agro-food industries visited, 4 non-food industries were visited purposely to learn some of their best practices in relation to logistics management.

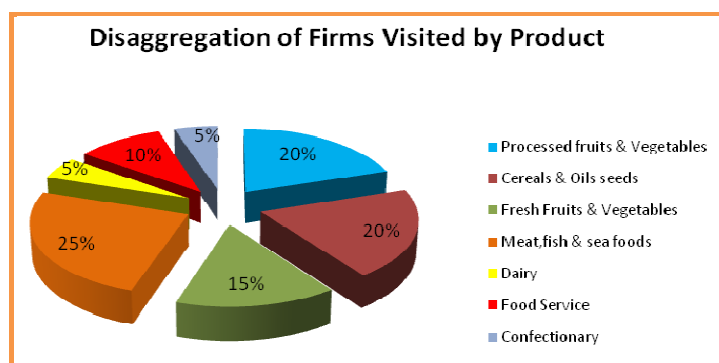


Figure 1. Disaggregation of agro-food industries studied by product lines

3.2 Existing Logistics Management Practices in Small, Medium and Large Scale Agri-Food Enterprises

3.2.1 Transportation and/or Fleet Management

In general, finished products were either delivered to specific sales points or collected from premises by sales agents for on-ward distribution to customers as shown in Figure 2. Transportation was either managed by the firms, combining own transport with outsourcing or completely outsourced.

For small-scale firms using own transport for product delivery, vehicles (examples Kia cargo trucks and Ford courier) were washed and disinfected regularly and there was also regular maintenance schedule in place. Although this was a challenge due to cost implications they were obliged to keep their vehicles in good shape to ensure timely and quality product delivery, ensure customer satisfaction and stay competitive in the industry. For small scale firms, although the conditions of vehicles were rated satisfactory by respondents, the quantities were said to be inadequate. There were reported cases of limited vehicles to transport products to sales points particularly, inadequate number of refrigerated vans for distance delivery points. Other challenges affecting efficient performance of transport services include unprofessional attitudes of mechanics and wastage in getting the right spare parts for vehicle maintenance. The complaint was that most local repairers resort to 'trial and error' practices due to lack of proper skills. Transportation for effective waste disposal was a challenge due to cost implications.

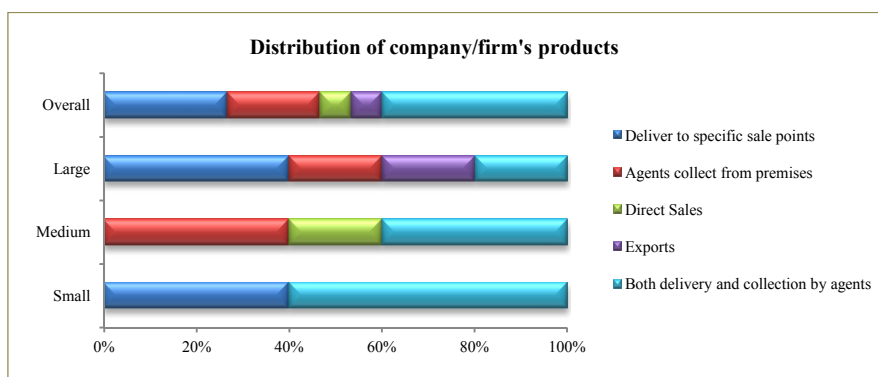


Figure 2. Distribution of products by firms visited

The medium-large scale firms had large consignments and therefore out-sourcing was more economical in terms of fleet management. The conditions of owned fleet of transport by the firms visited were satisfactory, at least as at the time of interviewing. The fleet of transport owned by medium and large scale studied was generally in good shape and better managed than the small-scale firms. Some large scale firms have maintenance departments and also used the services of shipping companies for exports. Types of vehicles used include KIA truck and Refrigerated Ford vans for delivery of export products. Outbound was usually managed by the medium and large scale firms with proper documentation for traceability purposes. Inbound was mostly out-sourced with effective inspection and supervision to ensure quality raw material supplies since with food product quality actually starts with quality raw material and packaging inputs.

In the case of medium scale firms visited, challenges affecting efficient performance of transport services include importation of spare parts for regular vehicle maintenance, effective ICT systems for tracking in transit and cost implication in relation to regular vehicle maintenance. In contrast, large scale firms visited had different transport related challenges. For these large scale agro-industries, traffic remains a huge constraints affecting efficient performance of transport services especially accessing the international Airport with regards to exports. Traffic is directly linked to timely delivery and food quality issues and there very crucial in exports. For example this explains why under the Millennium Development Authority (MiDA) construction of road network to the international airport for efficient exportation of horticultural products was a key issue. Other challenges were sourcing regional depot for distribution due to the poor road network and inefficiencies in managing own fleet of transport for in-bound supplies and this explains why in most situations, out-sourcing was preferred. Transporting employees to work for effective organizational performance was also mentioned.

3.2.2 Infrastructure and Equipment

The status of infrastructure for small scale firms at the time of this survey could be generally described as unsatisfactory. From participant's observational view point there were uncompleted ware-house facilities, lack of cold chain facilities and lack of space for storage of raw materials. For fairly new small scale firms, the equipment and other facilities were in good shape. However, the old firms needed replacement of obsolete equipment and facilities with modern ones. Untimely spare parts availability was mentioned as one of the challenges regarding maintenance of equipment. Equipment needs by the small scale firms include inadequate packaging and processing equipment both in terms of fewer quantities and inefficient performance, need for ICT equipment for traceability of deliveries, need for improvement in transport facilities such as refrigerated vans and a general need for financial assistance to source modern equipment and spare parts for regular maintenance.

With respect to medium scale firms, there were reported cases of inadequate housing, lack of space for packing vehicles, no place to store fresh produce harvested on the farm leading to quality loss and other equipment were left to the mercy of the weather. However, the large scale firms seemed to be doing well and relatively had adequate infrastructure for effective operations of the firms' activities. Most large scale firms had relatively excellent equipment. Good internet facilities, internationally standard labeling and weighing facilities, high standard equipment for quality control systems, good vehicles for sourcing raw materials and efficient delivery/dispatch of finished products. Particularly, the firms into exports had made huge investment in supply management systems by ensuring that every area of operations has the right equipment which makes operation very efficient e.g. efficient internet access, good customer database and the use of invoice voucher system/waybills for tracking purposes. Heavy equipment like forklift was made available to make stuffing of

containers easy and delivery to port on time. Like the medium scale firms, the large scale firms had preprinted packaging materials, sealers and pallet scales. Ship fleet for exports was a major challenge.

3.2.3 Quality of Customer Services and Order Management

Interactions with respondents of firms visited showed that customer satisfaction was important to growing businesses. According to respondents, customers were considered first in all activities making sure their demands were met. Constant interactions with customers were made through interpersonal communication, by way of telephone calls and site visits. Ensuring high quality of customer services and order management was crucial for attracting new customers, retaining existing relationships and building trust. Logistics related personnel of firms visited were asked to describe and explain the quality of service to customers and order management. Specific indicators used to describe the quality of customer service included response time (order acknowledgement, queries, extra), information available to customers (items, lead times, order status, extra.), percentage of orders delivered error-free (Orders are complete with proper documentation, labelling, and without damage to items or packaging), percentage of orders delivered on-time (Orders received on or before the date requested) and percentage of orders delivered in full (Orders complete in quantity). With the exception of response time (order acknowledgement, queries, etc) and percentage of orders delivered on-time (Orders received on or before the date requested), quality of service and order management were rated above 85% by the firms visited as indicated in Figure 3.



Figure 3. Quality of service and order management

Responses on other quality of service to customers and order management are presented in Tables 2 and 3.

Table 2. Responses on other quality of service to customers and order management

Customer Service	Description/Efficiency
Number of stock-outs	Almost all the firms indicated that they had no stock-out. Usually production was by order.
Number of claims and items returned	According to respondents this rarely happened
Number of back-ordered lines	About 10% (This was indicated by 1 out of 20 firms visited)
Average back order time	No responses.
Customer satisfaction survey	7 out of 20 were doing this. Averagely, customer satisfaction was rated 87%.
Promotional Activities	6 out of 20 answered this question. Promotional activities were very effective and reflected in sales

Table 3. Management of material handling and storage

Small scale	Medium Scale	Large Scale
Don't store raw materials for long-supply materials just on time;	Raw materials are purchased just in time;	Logistic department and quality assurance department handle supplies;
Make sure that products are washed, disinfected, stored in a cold room and transported in a refrigerated van to the sales points or customers;	Proper handling practices, good storage practice and stock taking;	Practice first-in first-out with tags on batches;
Take inventory regularly;	Storage system is managed by logistics manager and a team of supply chain personnel;	Spare parts are stored at the storeroom and apply management techniques;
Practice the first in first out system;	Orders are placed by clients-first in first out is practiced;	The raw materials are stored at the bunch reception before processing starts;
Stocks are managed through phone calls, standing orders and e-mails as well as direct calls to customers.	Production and marketing managers take care of inventory;	The finished products are stored in tanks at the right temperature and moisture content;
	Stocks are managed by producing on orders.	Orders are by contracts and delivery done as per contracts;
		Website linkages managed by ICT specialist.

3.2.4 Level of Use of ICT within Agri-Food Processing Firms

As indicated in Figure 4, the most utilized Information and Communication Technologies (ICT) systems were mobile phones, internet access, wireless LAN (Local Area Network), telephone/fax, certified e-mail and bar coding. The less utilized ICT systems included Global Positioning System, Specialized Software, on-line tracking and Electronic Data Interchange.

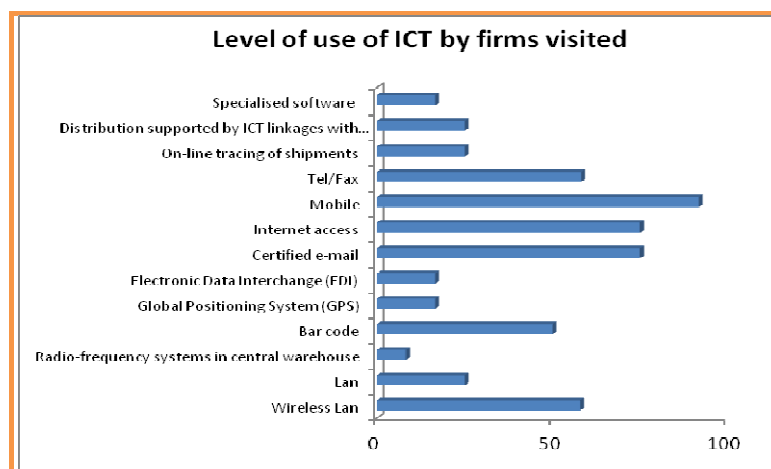


Figure 4. Level of ICT usage by the Firms

3.3 Main Logistics Challenges and Constraints Facing the Agri-Food Industries

Main Logistics Challenges and constraints facing the agri-food industries in Ghana were broadly categorized into lack of access to finance, lack of access to modern technology, environmental factors, lack of infrastructure, management and marketing problems, lack of raw materials and multiple taxes & levies. The rest are policy inconsistencies & government bureaucracy, unfair competition, information communication technology and non tariff barriers. Ranking of challenges based on the weighted averages of responses are presented in figure 5. The closer an attribute is to the center the higher the ranking. The strengths, weaknesses, opportunities and threats (SWOT) to the Agro-food industry in Ghana are presented in Table 4.

Table 4. SWOT Analysis of the Agro-food sector in relation to logistics management

Strength	<p>High sense of customer care/building relationship with clients</p> <p>High technological standards (quality assurance and safety management especially for medium-large scale firms)</p> <p>Availability of labour</p> <p>Efficient planning of logistics needs by large scale firms</p> <p>Branding in the case of medium-large scale firms</p>
Weakness	<p>Inadequate human resource capacity in logistics management</p> <p>Inadequate processing equipment both in terms of quantities and inefficient performance</p> <p>Obsolete machinery & equipment</p> <p>Packaging limitation particularly in the case of small-scale enterprises (use of manual sealing and unattractive labeling)</p> <p>Inadequate cold chain facilities & refrigerated delivery vans</p> <p>Inadequate working capital</p> <p>Inadequate warehousing and storage facilities</p> <p>Lack of standby generators/Irregular power and water supplies</p> <p>lack of access to modern processing technologies (for the small scale firms in particular)</p> <p>Lack of access to information & communication technology</p> <p>Lack of information, particularly about prices and market opportunities.</p> <p>lack of access to finance</p>
Opportunities	<p>High demand for convenient foods</p> <p>Export opportunities</p> <p>Availability of some modern processing technologies</p> <p>Government policies and focus on agri-business and entrepreneurial development as engines of economic growth</p> <p>Employment generation opportunities</p> <p>Free zone opportunities and other presidential initiatives</p> <p>Out-sourcing of some logistics needs e.g. in-bound services</p> <p>Availability of institutions for quality assurance and safety management</p> <p>Pre-processing activities close to the raw material source by some large scale firms</p>
Threats	<p>Unwillingness of financial institution to lend to the agriculture sector</p> <p>High interest rate on loans</p> <p>Unreliable supply of raw materials/Inadequate raw materials supplies for some seasonal crops</p> <p>Irregular supply of electricity</p> <p>High cost of fuel</p> <p>Poor road network especially to farms and raw material sources</p> <p>High traffic situations to airport and risk of vessel delays</p> <p>High cost of packaging materials</p> <p>Policy inconsistencies & government bureaucracy,</p> <p>Multiple taxes & levies</p>

Main Logistics challenges included lack of access to finance, policy inconsistencies & government bureaucracy, multiple taxes & levies, inadequate raw materials supplies, non tariff barriers, lack of access to modern

technology, lack of infrastructure, unfair competition, management problems, environmental factors, marketing problems factors, and information communication technology in decreasing order of importance. Other logistics challenges mentioned include poor road network to farms, high cost of packaging materials, high interest rate on loans, human resource capacity, traffic situation to airport and risk of vessel delays.

There were subtle differences in logistics needs among firms. For small scale agro-firms, logistics needs included financial support, refrigerated delivery vans, warehousing and cold room facilities and Human resources in logistics management. For medium scale agro-firms, logistics needs included financial support, storage systems, more cold vans, improvement in the road network, training, and generators to support power as well as decrease in fuel prices. For large scale agro-firms, logistics needs included cold storage facility, concrete plant system, ICT facilities, sourcing of raw materials from the sub-region, support for power supply, infrastructural development and utility source efficiency.



Figure 5. Ranking of challenges and constraints

4. Discussions

4.1 General Discussions

From the empirical findings, there was a clear difference in the level of infrastructural and equipment among enterprises by scale of operations. For example, while large-medium scale firms were better prepared in terms of managing risk of irregular electricity supplies the small scale firms were not and badly affected by frequent interruptions in electricity supplies in Ghana. Lack of standby generators to support cold chain facilities was also a huge issue expressed by most of the medium scale agro-food firms understudied. Maintenance of equipment was rated average probably due to general lack of maintenance culture among agro-food industries and also untimely availability of spare parts for replacement when needed (maintenance could sometimes be linked to replacement of old parts). Unlike the small scale firms, some of the medium scale firms had fairly good packaging equipment such as preprinted materials, scales and sealers as well as other fairly new packaging, labeling and weighing facilities. Some other facilities needed include storage facilities, dryers and milling machines.

Information and Communication Technologies (ICT) play a critical role in ensuring effective linkages between suppliers and customers as well as effective control of time, cost and quality of goods and services. From the literature well integrated ICT systems ensure efficient customer care which is a key requirement for agro-food business growth (Gracia et al., 2012; Ouma & Whitefied, 2012). There is a direct link between customer care and level of ICT usage; ensuring customer satisfaction requires effective communications through the use of ICT. From field observation, the large scale agro-industries constantly adapted their logistics management particularly ICT to industry best practices for effective product delivery in an ever increasing customer demand for food quality and safety era. This is also evidenced in the literature (Gracia et al., 2012; Ouma & Whitefied, 2012). From the results, quality of customer service with respect to response time (order acknowledgement, queries, extra) and percentage of orders delivered on-time (orders received on or before the date requested) was relatively

low among small-medium scale firms interviewed. This could be attributed to the logistics related challenges particularly the low use of ICT for on-line tracking.

The study also investigated the level of response from government and other development related interventions in addressing the challenges facing the agro-food industry in Ghana. It was realized that the Government of Ghana and its development partners have implemented some logistics improvement programmes. Some concrete interventions in the agro-food industries in Ghana include the following:

- Construction of three public pack houses by the Millennium Development Authority (MiDA) programme (Akwapim South District, Gomoa District, Yilo District) to support post harvest handling in the horticultural industry. Also under MiDA there was a major highway construction leading to the Kotoka International Airport to facilitate transportation of fresh produce and to support the growth of Ghana's horticultural exports. Feeder roads were also constructed in 8 districts in the MiDA intervention zones (<http://mida.gov.gh> accessed April 2012), implemented in 2006-2011.
- Construction of a Perishable Cargo Centre (PCC) at the Kotoka International Airport (KIA) for the handling and temporary storage of perishable produce (fruits and vegetables) for export under the MiDA program. This includes new shaded space with equipment for handling produce, cold storage facilities for palletized produce and area for customs and Phyto-sanitary checks.
- In terms of equipment supply, there is the government's Agricultural Mechanization Services Enterprise Centers (AMSECs) programme. The programme is a credit facility to assist the private sector to purchase agricultural machinery including primary processing machinery like rice mills and storage facilities and set up commercially viable AMSECs in strategic locations. The ministry of Food and Agriculture received support from Japanese Grant Assistance Programme and the Brazilian Government for the AMSECs program. Grainpro cocoons have been installed in the Brong Ahafo, Central and Northern Regions for grain storage by the National Food Buffer Stock Company (<http://mofa.gov.gh> accessed April 2012) on-going program
- Under GoG Youth in Agriculture Programme, the youth is encouraged to go into fishing, farming including livestock poultry production and agro-processing. Prospective beneficiaries are supported with feed, fingerlings, fish cages, ponds, training and other aquaculture inputs on credit. In addition, the agribusiness component seeks to assist the youth to undertake agri-business such as adding value to agricultural raw materials both food and non-food commodities through various forms of processing and marketing. (<http://mofa.gov.gh> accessed April 2012) on-going program.
- Implementation of Ghana Private-Public Partnership Food Industry Development Program sponsored by USAID and implemented in 2002-2005. This project sought to revitalize the Ghanaian horticultural subsector and to assist medium and small-scale producers in enhancing their incomes. One of the program objectives was to develop logistical chain to achieve products of specified consistency, quality and safety. Some industries that participated in this program include Family Traditions Enterprises, Processed Foods & Species, Integrated Tamale Fruit Company
- Agri-based Rural Enterprises Project funded by IFAD, GoG and African Development Bank concentrated on infrastructural development, modernizing agriculture centred on rural enterprises development, feeder roads construction in food production areas, increased access to credit among others (<http://rep-ghana.blogspot.com> accessed April 2012).
- President's Special Initiative on Cassava, a Ghanaian government initiative that sought to increase substantially the nation's foreign exchange earnings through the transformation of smallholder production methods and the processing of cassava for export. Under this initiative the Ayensu Starch Company in Ghana's Central Region was established.
- Free Zones Programme under the Ghana Trade and Investment Gateway Project established 238 new free zone enterprises in the country including the Tema Export Processing Zone (EPZ) and the creation of a Multipurpose Industrial Park (MPIP). This project was sponsored by the World Bank. Tax exemptions have been granted where the beneficiaries are engaged in projects of strategic importance to the Ghanaian economy, or where the project is one that serves as a primary project from which other secondary projects evolve. Imports of a free zone developer, subcontractor or enterprise into a free zone are exempted from direct and indirect taxes and duties.
- Competitiveness and Investment Climate Strategy/Export Development and Investment Fund (EDIF) was instituted to boost the country's export drive, supporting industries with export potential with credit access for rehabilitation and retooling.

- The Ghana Commercial Agricultural Project (GCAP) seeks to improve the investment climate for agri-business growth through Private-Public Partnership (PPPs) approach to smallholder-large scale linkages and value additions in selected value chains. GCAP is at conceptualization stage, implementation yet to start, information available at <http://mofa.gov.gh>

4.2 Emerging Issues

From the above-mentioned interventions the issues with cold chains and storage systems, free zones and tax exemptions, lack of infrastructure, credit access and equipment indicated by respondents as challenges are being addressed but to a large extent existing interventions are limited to agri-businesses with export focus. Lack of access to finance, inadequate raw materials supplies, lack of access to modern technology, unfair competition (the market is flooded with imported goods) and issues with multiple taxes & levies still need to be given serious attention particularly for agri-businesses targeting the local and sub-regional markets. Other logistics challenges mentioned including poor road network to farms, high cost of packaging materials and high interest rate on loans will have to be dealt with so as to enhance growth in the agri-food industry.

5. Conclusions and Recommendations

5.1 Sharing Lessons among Firms – Upstream (Large Firms) to Down Stream (Small Firms)

Despite the challenges facing the agro-food enterprises studied, some lessons can be drawn from the large scale firms. The large scale firms invested in logistics management because it paid off. The logistics management team was given regular training, ICT traceability systems for quality assurance and applied efficient packaging and storage management techniques. The large scale firms maintained good relationship with their customers. Other lessons drawn from good industrial logistics management practice among large scale firms visited include (i) Efficient planning of logistics needs by short, medium and long term requirements, (ii) Outsourcing of some logistics needs as much as possible, like raw material supplies, transportation services and other inbound needs but also had in place systems for quality assurance and safety management, (iii) Quality of a product started with quality raw material and (iv) Pre-processing activities close to the raw material source to cut down on transportation cost and also to ensure quality of finished product.

Based on the nature of agro-industries in Ghana, the recommendations from this study are categorized under small, medium and large scale levels.

5.2 Recommendations for Small Scale Firms

- Capital investment to replace old machinery with new ones;
- Logistics expert required and there should be cold storage facilities at vantage points so that farmers can access and prolong the shelf life of their produce;
- Financial support and training on logistics management needed as part of expansion strategy for small scale firms;
- Short-term training and demonstrations on the role of proper logistics systems and management in modern agri-food industrial company needed.

5.3 Recommendations for Medium Scale Firms

- Financial support and training on logistics management needed;
- Alternative sources of power needed as well as effective and efficient electricity and water supplies;
- Support purchase of cold vans and Good road construction especially to farms;
- Agri-food processing companies must discuss their problems with the research institutes.

5.4 Recommendations for Large Scale Firms

- Availability of funds, effective facilitation to access capital and financial assistance to support farmers;
- Reduction of taxes (taxes on packaging material), import subsidy on packaging materials and equipments;
- Mechanized farming and irrigation systems in place for all season production of fruits and vegetables;
- Reduction of traffic situations to airport in Accra, reliable power supply (National grid), cold chains to keep raw materials in good condition;
- Human resource capacity in logistics management need to be improved, must hire the right personnel, re-train employees and provide tools for them to deliver;
- Improvement in road networks and maintenance of fleet for efficient transportation.

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