Evaluating the Effect of Logistical Drivers on Cocoa Supply Chain in Ghana: A Case of Transroyal Ghana Limited

David Asamoah
KNUST School of Business
Department of Information Systems and Decision Sciences
Kwame Nkrumah University of Science and Technology-Kumasi-Ghana.

Yarhands Dissou Arthur
University of education, Winneba.
College of Technology Education.
Department of Design and Technology Education
P.O.B OX 1277, Kumasi-Ghana.

Assane Stephen
KNUST School of Business
Department of Information Systems and Decision Sciences
Kwame Nkrumah University of Science and Technology-Kumasi-Ghana.

Abstract

This paper examined the cocoa supply chain in Ghana using Transroyal (GH) Ltd as well as producing a supply chain model that is peculiar to transroyal Ghana limited. The paper conducted with strong data reliability and found to address some pertinent factors affecting the logistical drivers of transroyal Ghana Limited. Some of the logistical driver were found to be very significant and their correlations were found to be significant. The study revealed strong levels of interdependence between actors within the supply chain. It also revealed that, Transroyal (GH) Ltd has not been able to fully reap the benefit of procurement, transportation and internal systems integration. It also revealed that ICT is not fully embraced within the operations of the company but the most successful driver in the business was cash flow. The conclusion is that competition has shifted from individual efforts of companies to cooperation relationship with complex interdependence, so if Trans royal (GH) Ltd wants to grow in this business, then, pragmatic and cutting edge solutions and systems should be put in place to overcome competitive rivalry among LBCs in Ghana. The company should examine its operations, eliminate waste, inject efficiency and create wealth for its shareholders.

Keywords: Cocoa, Supply chain, Logistical drivers and Transroyal

1.0 Introduction

The importance of cocoa in the economy of Ghana cannot be overemphasized. The introduction of cocoa into Ghana is credited to Tetteh Quashie a native of Ghana who is said to have traveled from Fernando Po in 1879, though early attempts of introducing the plant had been made by the missionaries that first came to Ghana. Cocoa was cultivated as ornamental plant but not in commercial quantities. The introduction cocoa to the eastern region of Ghana was embraced by the people residing in that region. After seeing its economic potential they joined in the cultivation and soon galloped Ghana to become the world's leading cocoa producing country by 1911, exporting 41000 metric tons amounting to 40% of global output. There was the need to put in place an independent body charged with the responsibility of overseeing all cocoa matters, hence the formation of The Ghana Cocoa Board (Cocobod) in 1947. Since its inception, the Cocobod has discharged its oversight duty chalking many successes. The falling prices at the world market and the neglected intensity of the stewardship duty of Cocobod resulted in the decline of cocoa production during the 1983/84 season, reducing Ghana's contributions to only 10% of global output. The Cocoa Industry has been the backbone of the Ghanaian economy.

It contributions to the economy of the Country in terms of foreign exchange earnings, Government revenues, employment creation and poverty alleviation (reduction and extension of development projects) and social services to farmers.

Exports account for 30% of the Country's GDP with Agriculture contributing around 40% of export earnings. Cocoa is the largest contributor to these earnings providing up to 75% of it. Cocoa offers direct employment (Farmers, Farm Laborers', etc) to over two million people and indirect employment (Support to the Industry) of beyond three million. These people are employed from the western, Ashanti, Brong Ahafo, Central, Eastern and Volta regions. Ghana remains world second largest producer of cocoa with the best quality which earns a premium price from its sale on the international market. (PBC 2007)

Many attempts have been made to revamp the industry by Cocobod because of healthy political will from successive governments. These interventions are aimed at creating a sustainable cocoa production in Ghana. A sustainable cocoa economy is where each person investing time or money into the supply chain would be able to earn a decent income for themselves and their family, work in good conditions, and in a manner which do not harm the environment (Oxfam International Research Report, 2008).

By the time cocoa products hit store shelves they have moved through a long and complex supply chain which comprise of collectors, traders, exporters, processors and manufacturers. The cocoa bean is typically grown on small family farms that use labour-intensive practices. The International Cocoa Organization (ICCO) estimates that approximately 90 per cent of the world's cocoa is produced by 3 million such smallholders. Worldwide cocoa production employs approximately 14 million individuals, with Western Africa alone employing 10.5 million. Four West African countries - Côte d'Ivoire, Ghana, Nigeria and Cameroon - dominate the global supply, producing approximately 70 per cent of the world's cocoa beans. Côte d'Ivoire and Ghana are the two largest global producers, accounting for 56 per cent of all traded cocoa. (International Cocoa Organisation, 2010).

West Africa is the largest cocoa supplier, accounting for 70 per cent of worldwide cocoa production. Ivory Coast and Ghana are the two largest cocoa-producing countries. In the harvest year 2006/07 they held a combined average market share of 56 per cent. Cocoa cultivation in Ivory Coast and Ghana are usually a family activity.
Statistics indicate that farm sizes typically average less than ten acres in the Ashanti and Eastern regions, and 10 to 20 acres on the average in the Western North and Western South regions. Such detailed statistics are not available for Ivory Coast; however, it is known that there are no large cocoa fields there. It is said that farmers in Ivory Coast own between 1.75 and 5 hectares. In Ghana and Ivory Coast farmers harvest on average 300 to 400 kilograms of cocoa beans per hectare per year. This is 30 to 50 per cent lower than the potential productivity per hectare. The reasons for this lower productivity are diverse. The cocoa trees there are, on average, old and the farmers often do not possess the technical and financial capability to raise productivity per hectare and the quality of the beans. Ghana has approximately 720,000 cocoa farmers. After harvesting, fermenting and drying, the cocoa beans are sold to one of the government-approved traders or Licensed Buying Companies (LBCs). The Licensed Buying Companies operate through recognised buying centers in cocoa producing regions. The traders give the farmers a minimum price determined by the Producer Price Review Committee (PPRC).

The Ghanaian government stated in 2004 that Ghanaian farmers would from 2004/2005 onwards receive at least 70 per cent of the international cocoa market price, as recorded by the London International Financial Futures and Options Exchange (LIFFE) and New York Board of Trade. However, it has not yet realized this objective during the harvest periods of 2004 up to 2007. The next step in the cocoa supply chain involves the inspection of the beans by the government. Cocobod's quality division (the Quality Control Division) samples and weighs the cocoa. For this, the division charges a price determined in advance by the PPRC. The recognized traders then transport the weighed and sealed bags to so-called 'takeover points (Tema port, Takoradi port and the Kaase inland port in Kumasi). These are the locations where the cocoa sold to the Ghana Cocoa Board, at a price that is once more determined by the PPRC are kept pending sales to internal cocoa processing businesses and export abroad. Subsequently, Cocobod sells the cocoa to exporters or to companies that will process the cocoa themselves. A total of 75 per cent of the cocoa beans from Ghana is exported to the following eight countries, listed here according to the size of their imports: The Netherlands, Malaysia, United Kingdom, Japan, Estonia, United States, Belgium and Turkey. The Netherlands are by far the largest importers. This is partly due to the major cocoa grinding installations of Cargill and Archer Daniels Midland (ADM) situated in Amsterdam. Both companies dominate the cocoa grinding market.

The value-chain of cocoa as presented by the former chief Executive of Cocobod.It goes on to focus on the key issues such as quality compliance to international standards, the various interventions towards sustainable cocoa production, ascertain logistical problems of stakeholders, investigate fair-trade, determine traceability of cocoa, compare feasibility of the production of organic cocoa and finally attempt to discuss the existence of child-labour issues within the supply-chain of cocoa in Ghana. After this general overview, the project will be narrowed to the supply chain of cocoa as peculiar to Transroyal (GH) Ltd with special focus on logistical drivers and the supply chain performance to the national supply chain of Ghana.

2.0 Theoretical Considerations of Supply Chain

Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996). Supply chain management spans all movement and storage of raw materials, work-in-progress inventory, and finished goods from points of origin to point of consumption.

A customer focused definition is given by Hines (2004) as "Supply chain strategies require a total systems view of the linkages in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. As a consequence costs must be lowered throughout the chain by driving out unnecessary costs and focusing attention on adding value through output efficiency must be increased, bottlenecks removed and performance measurement must focus on total systems efficiency and equitable reward distribution to those in the supply chain by adding value. The supply chain system must be responsive to customer requirements." Global supply chain forum - supply chain management is the integration of key business processes across the supply chain for the purpose of creating value for customers and stakeholders (Lambert, 2008).

Supply chain management is the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole (Mentzer *et al.*, 2001).

Supply chain has evolved over the years due to globalization, the need to create strategic relationship with customers and specialization. Supply chain management is a cross-function approach which includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

3.0 Supply chain and competition

According to krajewski and Ritzman (1998), competition has shifted from individual companies to supply chains. To win the supply chain war, one must come out with innovative supply strategy with cutting- edge solutions. Supply chain innovation can be achieved through better supplier relationships, costs improvements and quality managements. It must go to position the supply chain and finally ensure a strategic fit between corporate strategy, operational strategy and functional strategy.

According to Sunil and Meindl (2007), supply chains have cycle view including ordering cycle, replenishment cycle, customer demand cycle and procurement cycle. The procurement cycle otherwise known as purchasing function is an important key performance indicator in the entire supply chain which should ensure value for money within the supply chain concept. According to Lyson and Farrington (2006), there are a number of techniques that can be used to obtain the best value for money from the purchasing process. These include the following: Value analysis including the elimination of unnecessary product features.
Consolidation of demand (that is aggregating several orders to negotiate discounts)

- Negotiating contracts or prices centrally.
- Ensuring completion in the procurement process, often by challenging the use of preferred supplier.
- Buying complete sub-assemblies, rather than components.
- Refurbishing existing items, rather than replacing them.
- Encouraging standardization, thus reducing the costs of spares and maintenance.
- Adopting a whole-life approach, rather than an initial-price approach.
- Eliminating unnecessary inventory.
- Eliminating non-productive costs, such as travel expense.

4.0   The Case of Transroyal (GH) Ltd

The supply chain of Transroyal is not different from the others LBCs. This is because all the LBCs operate under an administrative blue-print of the Produce Buying Company (PBC) Anthonio and Darkoa (2009). Produce Buying Company took over all the structures from Cocobod and put in place a system of operations which has come to stay for all the other companies to emulate. Transroyal is no exception, it copied the existing status quo. What makes the supply chain of the companies different from others is the efficiency levels and how individual activities are handled. Transroyal operations consist of both inbound and outbound logistics. The inbound logistics involves carting stocks from societies to the depot for inspection by the quality control division. To focus on its core business, the company which hitherto was charged with inbound logistics has devised a policy of joint ownership with district managers to procure trucks for primary evacuations. The essence is to task district managers to manage the trucks well otherwise they lose their interest in the truck. The district managers are motivated to maintain the trucks since they have the option of working to pay for the loan and completely own the truck.

Regarding secondary evacuation, (moving stocks from depots to take-over points) outbound stocks are in the hands of a mother company called Global haulage which has headquarters in Accra. Below is graphical comparison of the national supply chain of cocoa in Ghana and that of Transroyal (GH) Ltd.
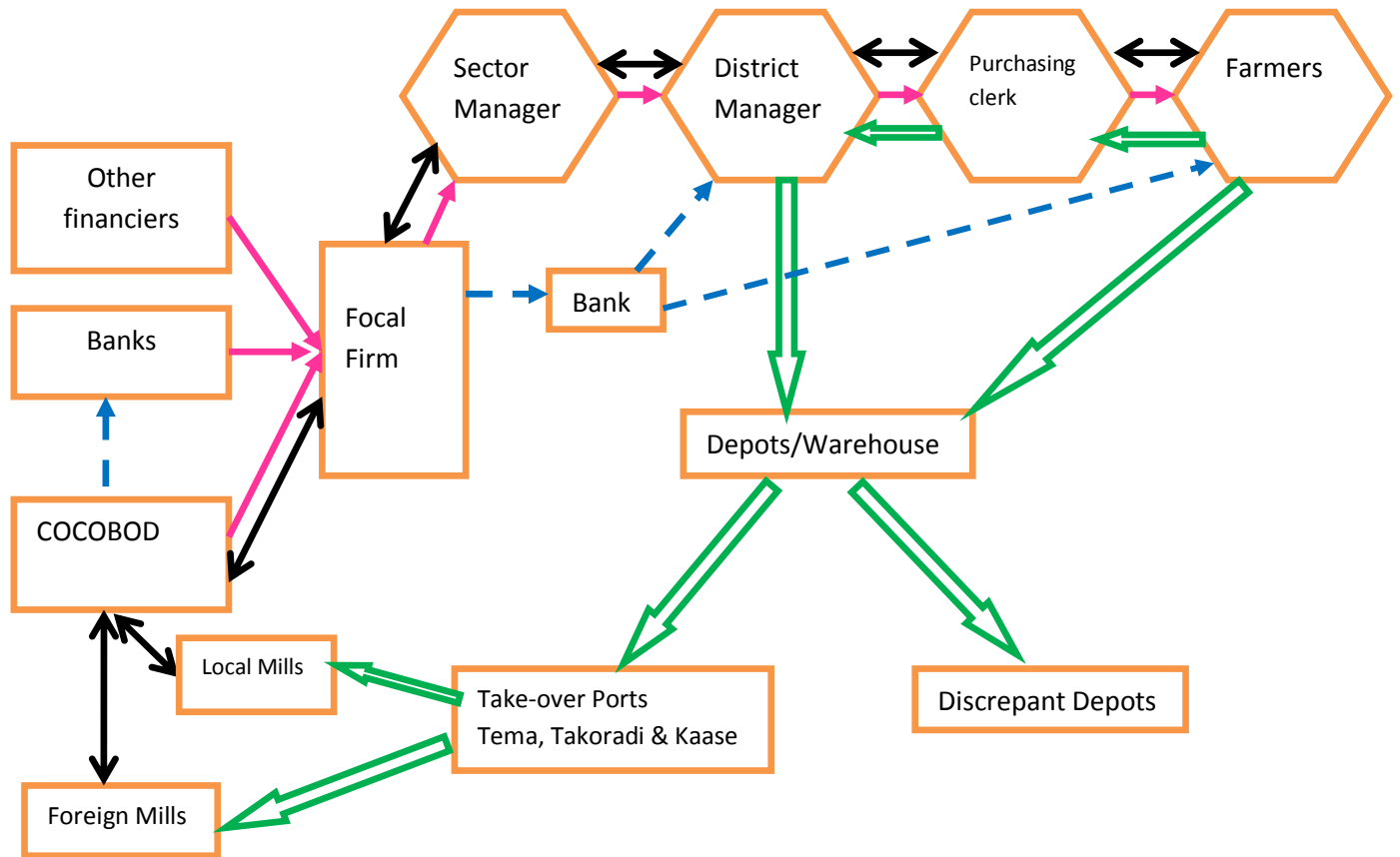
5.0 Material and Methodology

Data collection instruments used includes observation, interview and questionnaire administration. Observation guide was prepared and used to collect data on port operations and some farmers using the simple random sampling technique. The intention was to avoid biasness and also ascertain the validity and reliability of the information provided on the answered

Questionnaires. Interview was used to collect data and information from the management of the company and the quality control officers at various ports as well. Questionnaires were self-administered to quality control junior staff, all district and sector managers of Transroyal GH Ltd and all selected farmers to ensure data quality. Descriptive and inferential statistical analysis was deplored in the analysis of the data. Frequency distribution of the various logistical drivers was formed and chi-square test was applied to access the level of significance between the respondent's responses.
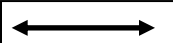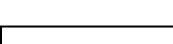
Content analyses were carried out to facilitate the formation of frequency distribution tables and charts and to summarize and describe the some aspects of this research. The use of relative importance index (RII) was used to determine which of the logistical drivers (transport, warehousing, inventory and information) contributed towards the overall company objective of profitability at minimum costs. In this process, the logistical drivers were scored to ascertain the preference levels using the standard scoring table developed by experts. After that, a pair wise comparison was made to enable rankings to be made.

6.0 Results and Discussions

Supply Chain Map for Transroyal (GH) Ltd.

KEYS

←——→	Information Flow
⇒ (green)	Inventory
→— (pink)	Cash Flow
- - -→ (blue dashed)	Telegraphic transfer/cheque

The supply chain of Transroyal (GH) shows not only inventory movement but also the logistics of cash and information. It depicts strong array on interdependence between all the actors within the supply chain as shown in figure 4 above.

Table 1.0 Statement of Facilities

	Cumulative disagreement	Neutral	Cumulative agreement	Chi square test
Warehouse	18	4	56	$x^2(4, 0.05) = 37.64, p < 0.005$
company scale	43	4	28	$x^2(4, 0.05) = 80.9, p < 0.005$
Tools of trade	48	2	26	$x^2(4, 0.05) = 51.37, p < 0.005$
Tarpaulin	46	12	18	$x^2(4, 0.05) = 21.74, p < 0.005$
Gratings	40	14	24	$x^2(4, 0.05) = 58.2, p < 0.005$
Sieves	48	10	18	$x^2(4, 0.05) = 42.95, p < 0.005$
Stationeries	16	2	58	$x^2(4, 0.05) = 86.11, p < 0.005$

The chi-square goodness of fit test indicated that, there were significant differences in the proportion of respondent who believe that the company has provided warehouses, scales, enough tools of trade for further expansion, tarpaulins, gratings and sieves to all purchasing clerks. The table above indicates the chi-square test statistics values and their associated p- values .This means that the company is doing well so far as the provision of stationary and warehousing are concerned but majority believe that some significant number of purchasing clerks have not been given company scale to work. They also believe that the performance of Transroyal is not the best in terms of the remaining tool of trade to be provided.

Table 2.0 Statement of Inventory

	Cumulative disagreement	neutral	Cumulative agreement	Chi square test
Depot capacity	28	2	48	$x^2(4, 0.05) = 34.1, p < 0.005$
Society shed capacity	40	12	26	$x^2(4, 0.05) = 18.15, p < 0.005$
Depot stock	30	12	26	$x^2(4, 0.05) = 56.1, p < 0.005$
if quality problem	28	10	40	$x^2(4, 0.05) = 30.46, p < 0.005$
Jute sacks availability	30	16	32	$x^2(4, 0.05) = 12.5, p < 0.05$
Quality control staff	20	12	32	$x^2(4, 0.05) = 7.85, p > 0.05$
company profitability	18	16	40	$x^2(4, 0.05) = 28.97, p < 0.005$

The chi-square goodness of fit test indicated that, there were significant differences in the proportion of respondents who believe that their district purchases are more than their depot capacities, society shed capacity, defect of depot stocks, availability of jute sacks, and the district purchases maximization of company profitability, but the quality control staff timely responds was found not to be statistically significant which indicates a very small discrepancy between the observed and expected frequencies as shown in the table above. Majority agreed that indeed the company has provided depots but their purchases are more than their depot capacities. They also believe that their purchases are enough to maximize profits for the company. On top of this the respondents believe that defective stock is reconditioned faster.

Table 3.0 Statement of Transportation

	Cumulative disagreement	neutral	Cumulative agreement	Chi-square test
Secondary evacuation	46	6	24	$x^2(4,0.05)=15.58, p<0.005$
current secondary evacuation	36	10	30	$x^2(4,0.05)=8.21, p=0.08$
current primary evacuation	14	14	50	$x^2(4,0.05)=59.18, p<0.005$
primary and secondary	16	6	56	$x^2(4,0.05)=39.69, p<0.005$
longest supply chain	20	22	36	$x^2(4,0.05)=14.1, p<0.05$
In-house primary and secondary	12	18	48	$x^2(4,0.05)=22.26, p<0.005$

Table 4.0 Statements of Information and Communication

	Cumulative disagreement	neutral	Cumulative agreement	Chi-square test
Company embrace ICT	36	10	28	$x^2(4,0.05)=5.1, p=0.28$
Information delivery is accurate	22	16	40	$x^2(4,0.05)=23.79, p<0.005$
Easy access to relevant information	30	16	32	$x^2(4,0.05)=10.87, p<0.005$
Benchmark of company performance	28	12	38	$x^2(4,0.05)=36.1, p<0.005$
Directive from COCOBOD	12	24	42	$x^2(4,0.05)=25.33, p<0.005$
Dual information flow	12	16	50	$x^2(4,0.05)=44.82, p<0.005$

The chi-square goodness of fit test indicated there were no significant differences in the proportion of respondents who believe that the company has embraced ICT as compared with the 5%, but the rest of the variables under the statement for information and communication were found to be significant. Most respondents believe that the current transportation strategy be improved to generate supply chain speed and translate to profitability. This could be made possible only if there is further outsourcing of the primary and secondary evacuation transport policy to inject efficiency in the system. The general consensus here was that respondents agreed with the statements that information delivery is accurate; there is easy access to information, easy comparison to other firms in the industry. They also agreed to the fact that directive from Cocobod comes the right source but disagreed to the fact that the company is ICT compliant.

Table 5.0 Statements under Finance

FINANCE	Cumulative disagreement	neutral	Cumulative agreement	Chi-square test
Fund support	12	12	50	$x^2(4,0.05)=36.54, p<0.005$
Cash flow	14	8	58	$x^2(4,0.05)=61.32, p<0.005$
Flexible cash policies	16	8	52	$x^2(4,0.05)=28.21, p<0.005$
Risk management	22	18	36	$x^2(4,0.05)=7.31, p=0.07$
Causes of cash shortage	32	18	28	$x^2(4,0.05)=19.69, p<0.005$

The chi-square goodness of fit test indicated there was no significant difference in the proportion of respondents who believe that risk management of fund is paramount in the operations of Transroyal (GH) Ltd but the rest of the variables remain statistically significance. The percentage total score indicates than respondents agree that the Transroyal GH Ltd is doing well in all the assessed variables with the exception of the statement that district managers and purchasing are the cause of shortage within the supply chain.

The table above indicates the chi-square test statistics and their associated p-values.

Table Correlation between the Logistical Drivers

	Facility	Inventory	Transport	ICT	Finance
Facility	-	-0.245*	0.087	0.357**	0.035
Inventory		-	0.149	0.268*	0.241*
Transportation			-	0.066	0.54**
Information				-	0.025
Finance					-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

From the output above, the correlation between the logistical drivers for facilities, inventory, information& communication was found to be very significant indicating high level of association between the logistical drivers.

Conclusions

The study was conducted with strong data reliability and was found to address some pertinent factors affecting the logistical drivers of transroyal.Some of the logistical driver were found to be very significant and their correlations were found to be significant. The paper also produced a supply chain model that is peculiar to transroyal Ghana

The study examined the cocoa supply chain in Ghana using Transroyal (GH) Ltd as a focal firm. The study revealed strong levels of interdependence between actors within the supply chain. It also revealed that, Transroyal (GH) Ltd has not been able to fully reap the benefit of procurement, transportation and internal systems integration even though the features of the company exhibited a stage I position on the Supply Chain Operations Reference model (SCOR). It also revealed that ICT is not fully embraced within the operations of the company but the most successful driver in the business was cash flow.

Transroyal has low levels of rejected stocks but should not be complacent because the levels alone do not matter, but the other qualitative factors as well. The impact of rejected stocks was mild compared to the past 10 year's purchases. It was established that he correlation between all the logistical drivers were statistically significant and therefore implying that equal attention be given to all the logistic drivers.

Finally, the conclusion is that competition has shifted from individual efforts of companies to cooperation relationship with complex interdependence, so if transroyal (GH) Ltd wants to grow in this business, then, pragmatic and cutting edge solutions and systems be put in place to overcome competitive rivalry among LBCs in Ghana. The company should examine its operations, eliminate waste, inject efficiency and create wealth for its shareholders.

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