



Ministry of Finance and Economic
Planning

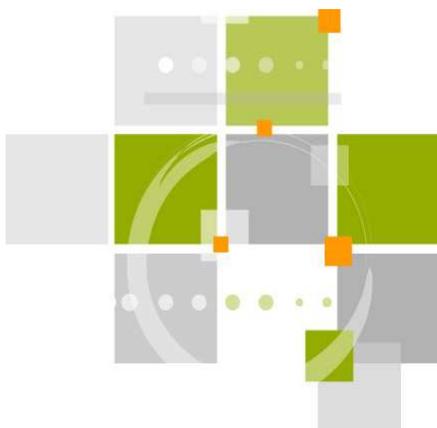


Republic of Ghana

Integrated Transport Plan for Ghana

Volume 3: Commodities Generation and
Transport in Ghana

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Executive Summary

The present report provides an analysis of major commodities that generate demand for transport, both domestically and internationally. It is not intended to produce any kind of forecasts of demand for freight traffic, itself a separate output from the ITPG project. The main thrust of the commodity report is to illustrate the physical form of the major sectors of the Ghanaian economy in terms of output. This output is measured principally in metric tonnes and that is the common measure applied throughout the present study.

Together with the macroeconomic forecasts presented in Volume 2, the Economic Analysis and Forecast Report, this commodities study will constitute the empirical core for traffic forecasting.

Each sector of the economy: minerals, timber and the whole agricultural sector exerts different impact upon demand for transport. This impact differs depending on whether one makes a macroeconomic evaluation or attempts a sector-based approach. Minerals are the best illustration of such a two-tier approach. From the macroeconomic perspective, strongly biased towards assessment in terms of value, the mineral sector in Ghana is almost totally dependent on gold and diamonds which provide 95 per cent of export earnings generated by this field of economic activity. But from purely transport perspective these two items present no technical or operational problem as they total some 100 metric tonnes of high-value shipments. Conversely, some 2 million tonnes of manganese and bauxite cargoes, while being only 5 per cent in value of mineral exports, create various transportation problems, both on the land portion of the transport chain and in seaports.

This duality of impact exerted by each and every sector of the transport system can also be found elsewhere. For instance, in forestry there is a striking disproportion between timber and wood shipments domestically and for exports. There is as much as 35-40 times more wood being transported in Ghana domestically, and this is almost entirely firewood, than in exports which oscillate around 450-500,000 cubic metres per year. Needless to say the domestic transport of (principally) firewood presents quite different a picture from the transport standpoint and that many modes of transport are involved including head-carrying, as compared to more organized exports shipments of timber and wood products. But sheer numbers (potentially some 20,000,000 cubic metres of firewood) are evidence that the forestry in Ghana does have an impact on the country's transport sector. Regardless of its current state changes in energy consumption patterns will exert a downward trend on transport demand, particularly if one looks at this issue in the context of the emerging oil industry in Ghana.

The cocoa subsector is an issue of its own. There is no doubt that cocoa shipments are perfectly suited for containerisation, but containers have made very limited inroads in terms of land transport of cocoa. Furthermore, Ghana's plans to process increased quantities of cocoa beans in the country not only will change the volumes to be transported but also the trade patterns. Combined, these two trends will probably have a downward impact on demand for transport of cocoa.

But until there is a reliable alternative in the form of rail transport, the cocoa subsector will continue for many years to come to use road transport in break-bulk form for shipments to seaports. That will put pressure not only on trucking operations but also for the ports themselves where substantial volume of cocoa is stuffed into containers. Thus, two opposing trends may shape the cocoa transport in the next several years: continuation of break-bulk

operations in road transport on the one hand, and increasing share of processing of raw produce.

In terms of containerisation despite of the growing absolute numbers, the actual multimodalism has made rather little progress in Ghana. Most of the containers are still stuffed and unstuffed in ports which fact deprives importers and exporters of basic advantages of containerisation, its *raison d'être* being movement of a container from door-to-door without breaking the bulk. More effort is necessary to reap real benefits of containerisation in Ghana.

The single largest customer of the Ghanaian transport system is the country's agricultural sector. This sector not only provides close to 40 per cent of Ghana's GDP but directly or indirectly gives employment to some 60 per cent of the country's population. These figures are not going to change overnight. Agriculture will remain for many years to come the main sector of Ghana's economy.

But agriculture is grossly underfunded. There is a striking disproportion between its share in GDP and in the central budget. This issue was discussed in a greater detail in Chapter Six of this report.

Of many challenges faced by agriculture in Ghana, transport inadequacy is perceived as a major culprit. The ITPG Study Team do not agree totally with this opinion. While it is true that lack of rural access roads, particularly in the Northern parts of the country, is an obstacle to progress in agriculture, transport is just an element in the whole range of causes that prevent agriculture from making a substantial progress. That aspect of the problem goes, however, beyond the present study which focuses on transportation.

Logistics, crop management, distribution channels, etc. are the main factors that cause the situation in which up to 90 per cent of crops are consumed in raw form. That implies that only 1 tonne in 10 of the crops is processed, a fairly low share. Added to this is the wastage of crops, use of crops as animal feed and simple post-harvest mismanagement.

But the agricultural lobby, middlemen and the farmers themselves cannot expect the transport sector to cross- subsidize the agricultural produce, the bulk of which has a low unit value. The inability of most agricultural produce to bear the cost of transport is one of the major reasons, if not the principal one, of a low share of the overall agricultural output to be fit for transportation.

This is probably also one of the main reasons why farmers increasingly switch to industrial crops. If one tonne of cocoa beans is worth approximately Gh¢ 2,500 it is much more likely to absorb (presumably) high transportation costs than, for instance, one tonne of yam worth a few hundred cedi. That is why transport costs prevent larger volumes of main crops (yam, plantain, cocoyam, etc) from being transported over longer distances in Ghana.

The relations between agricultural output and demand for transport in Ghana are complex. But so are they in other sectors. There cannot and must not be one policy with respect to these relationships. It should vary from case to case but should always be founded on the principles of a sound economic analysis.

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Acronyms and Abbreviations

AAC	Annual Allowable Cut
B/L	Bill of Landing
BOST	Bulk Oil and Storage Company
cif	Cost, insurance, freight
COCOBOD	Cocoa Board
ECOWAS	Economic Community Of West African States
EEZ	Exclusive Economic Zone
EU	European Union
EWATA	Europe West Africa Trade Agreement
FAO	Food and Agriculture Organization of the United Nations
FCL	Full Container Load
fob	Free on board
GDP	Gross Domestic Product
GNPC	Ghana National Petroleum Company
GPHA	Ghana Ports and Harbour Authority
GRC	Ghana Railways Corporation
ITTO	International Tropical Timber Organisation
ITPG	Integrated Transport Plan of Ghana
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
NMT	Non Motorised Transport
PMMC	Precious Mineral Marketing Corporation
TEU	Twenty-foot Equivalent Unit
VLTC	Volta Lake Transport Company Ltd

Chapter 1 Introduction

This report on commodities was prepared after a series of meetings with the stakeholders who have primary interest in various commodities. It is taking into consideration not only the discussions the ITPG Study Team had with the stakeholders, but also the documents that were handed over to the Team.

This report deals with major commodities produced and transported in Ghana domestically and internationally. The main purpose of the document is to provide input to more detailed transport forecasts that will follow. As such the report was not meant to be anything more than an attempt at drawing a general picture of commodity generation in crucial sectors of the Ghanaian economy, and how these commodities impact the nation's transport system.

While containers are not a commodity *sensu stricto* they epitomize Ghana's commodity structure that relates to the country's foreign trade. For that reason they have been treated separately in the report.

The Study Team wish to express their gratitude to all those who have helped in data collection for this document. They are, however, solely responsible for its contents and the opinions expressed therein.

Chapter 2 Mineral industries in Ghana and their impact upon the country's transport needs

1. Introduction

Mineral exports accounted for 43.3 per cent of the total Ghana's export earnings in 2007 and, together with cocoa and timber, exceeded $\frac{3}{4}$ of the country's export revenues.

The contribution of the mineral sector to the Ghanaian economy grew more than threefold from the early 1990s to reach some 5 per cent of GDP in the current decade. Minerals industries are also one of the major employers in the country and a supplier of revenue for the Government through the payment of mineral royalties, income tax, corporate and capital gain taxes, etc.

But the extent of the impact of the mineral sector on the present and future transportation needs is a different story. The absolute dominance of gold and diamonds in the export earnings from minerals (95 per cent of the total) makes the relationship between this sector and the transport industry somewhat special. The actual transport needs of gold and other precious mineral is a non-issue. The shipments of precious minerals represent altogether less than 100 metric tonnes a year.

There remains the 5 per cent of the value of mineral exports which include two main commodities: bauxite and manganese. The overall production of mineral industries is shown in Table 1 below.

2. Structure and organisation of the mineral industries in Ghana

Under the Ministry of Lands, Forestry and Mines, the Minerals Commission is the entity that oversees all the aspects of Ghana's mineral sector. It grants mining and exploration licences, regulates the industry and gathers geological data.

The emerging oil and gas industry in Ghana is under the purview of Ghana National Petroleum Corporation (GNPC), while the Precious Mineral Marketing Corporation (PMMC) oversees all the issues relating to promotion and development of small scale mining companies.

Despite the significant progress made in the recent past the mining sector in Ghana faces many challenges which are both internal and external in nature. Some of these challenges include:

- Environmental issues and social conflicts arising therefrom;
- Reducing the over-reliance on traditional minerals (gold, diamonds, bauxite, manganese) and increasing the role of other minerals, such as iron ore, limestone, kaolin, silica sands, quartz, etc;
- Improving the availability and sufficiency of geological information to assist prospective investors;
- Assisting small-scale miners and providing them with geological information and financial assistance;
- Ensuring equitable distribution of benefits from mining among all stakeholders;
- Attracting more local capital;
- Integrating the mining sector into the national economy to improve the level of retained earnings from mining activities;
- Ensuring adequate consultation with other sectors in the planning and development of economic infrastructure to take account of the requirements of mining activities (e.g. energy and transportation).

3. Output of mineral industries in Ghana

Table 1 below shows the evolution of the output from the mineral industries in Ghana during the period 2002-2006.

Table 1 : Ghana production of major minerals 2002-2006

Commodity and Unit	2002	2003	2004	2005	2006
Bauxite ('000 metric tonnes)	684	495	498	607	842
Aluminum smelter('000 metric tonnes)	117	16	0	13	36
Cement, hydraulic('000 metric tonnes)	1900	1900	1900	1900	1900
Diamonds, raw ('000 carats)	963	904	920	1013	973
Gold (metric tonnes)	69.271	70.749	63.139	66.852	66.205
Manganese, ore processed ('000 metric tonnes)	1136	1509	1597	1715	1600
Salt ('000 metric tonnes)	99	250	265	250	250
Silver(kilograms)	2129	3379	3329	3571	3142

Source: Mineral Yearbook Ghana: op.cit, p. 18.3

Notes:

- Ghana does not yet produce crude oil and natural gas
- Figures for precious metals and for diamonds do not include smuggled or undocumented production
- Cement is produced only from imported clinker
- Most of data in table 1 has not been corroborated

- Figures provided subsequently to the Study Team stipulate the following output in 2007:
 - Gold: 2,547.7 thousand ounces
 - Diamonds: 839,235 Cts
 - Bauxite: 1,033.4 thousand tonnes
 - Manganese: 1,305.8 thousand tonnes
 - Salt: 124.1 thousand tonne

For the first three quarters of 2008, the production of manganese was 740,852 tonnes. Annualized, that figure would give the total output of around 1,000,000 tonnes. For bauxite, the output during the first three quarters was 482,527 tonnes, which on an annual basis, would total 643,000 tonnes.

Although the figures in table 1 are either preliminary or mere estimates, they point to big variations in output. Changes are mainly caused by world demand for minerals but also by internal factors related to the structure of mineral industries in the country¹.

The evolution of mineral production in Ghana in the years 2002-2006 was as below:

Table 2 : Evolution of mineral production in Ghana 2002-2006

Commodity	2002=100
Bauxite Ore	123
Smelter Primary Aluminum	30
Hydraulic Cement	100
Diamonds	100
Gold	96
Manganese	141
Salt	252
Silver	148

Source: Based on data from table 1

Apart from the commodities listed above certain quantities of crude construction materials, such as clays, sand, stone, gravel, limestone and lime used for treatment of gold ores, were produced. However, no readily available data for these materials exist.

4. Impact of mineral industries in Ghana upon transport activities

There are several different aspects of mineral production in Ghana that impact the transport output. Firstly, it is the in situ transportation of ores and accompanying minerals, such as sand

¹ The mineral sector in Ghana is almost totally privatized, with the exception of the diamond mine in Akwatia. The sector remains mostly under foreign control, mainly due to insufficiency of local capital. Small-scale mining, however, is secured locally. It plays quite an important role. For instance, total gold production by small-scale miners increased from 2.2 per cent in 1989 to 10.5 per cent in 2005. For diamonds small-scale operations provided 88.4 per cent of cts. See: National....op.cit; p.3

and stones. This type of transportation is predominantly executed by own-account transport provided by the mining companies. As such this type of transport is of a lesser interest for the present report, although some degree of interaction between own-account and for-hire transport may take place. The in situ transport activities are a part of the production process of ores and their processing in smelters (negligible volumes).

The second type of transport activities involved in exportation of minerals from Ghana relates to land transport. Apart from gold, diamonds and silver, it involves movements between the mines and seaports. Takoradi is the principal gateway for minerals exported from Ghana.

The quasi totality of these shipments is made by rail and road, during the occasional stoppages of work by GRC, like the one that lasted several months in 2008. Rail transport of minerals is more economical than road transport which, in addition, has a negative impact on the road network².

The third type of transport involves ocean shipping. It is virtually foreign-owned ships, either chartered by the mining companies, or the importers' ships that ensure the traffic. The overseas destinations for the bauxite exports include North America, Europe and Asia. Manganese exports are shipped mainly to Europe and China. Out of 1.6 million tonnes of manganese exported in 2006, 832,000 tonnes, or 52 per cent, were shipped to Ukraine, 584,000 tonnes (37 per cent) went to China and 184,000 tonnes (11 per cent) to Norway.

The destination of manganese exports is determined by the needs of steel producing countries, like Ukraine, since the manganese is a crucial component in steel production³.

Ghana is one of the major producers of manganese. Therefore, there are rather good prospects for manganese exports from Ghana. They are expected to grow by an average of 4 per cent per annum during the 2008-2012 period⁴.

Mineral exports from Ghana are almost totally seaborne. There are two major shipping terms for that commodity: export on an f.o.b or c.i.f basis. Under the former the exporter, i.e. the mining company, has to deliver the cargo at its expense to the ship, wherefrom the importer takes charge of it. Under the c.i.f arrangements the exporter pays for the transportation of the cargo to the port of discharge.

It is not quite clear to the Consultant how much of mineral exports from Ghana falls into one of the other category but the information obtained by the Study Team suggests that the mining companies in Ghana are involved in chartering foreign-owned shipping space.

There are definite problems with handling of mineral exports from Takoradi, both on the land leg of the transport chain, as well as in the port itself. Since the depth at berth in Takoradi is insufficient to accommodate a typical bulk-carrier plying these trades, handling is made with the use of barges which delay transshipment and increase port round time for the vessels. The

² Trucks used for minerals have a capacity of 60 tons or more and cause extensive damage to the pavement.

³ Norway is not a major steel producer. The explanation for this sizeable share is that manganese shipments to Norway are actually destined for Sweden but they pass through an ice-free Norwegian port of Narvik before being shipped by rail to the Swedish iron ore producing area of Lulea (inaccessible in winter due to freezing)

⁴ See: Business Monitor International: The Ghana Mining Report 2008, p. 2. It should be emphasized, however, that under the current recessionary conditions of the world economy this forecast may need to be revised.

process has a clearly negative impact on the total transport cost of the minerals from the mine to the final overseas destination.

5. Prospects for mineral exports from Ghana

As mentioned above, the prospects for mineral exports seem quite good. The most important component of Ghana's mineral exports is of course gold and other precious minerals, which account for almost 95 per cent of export earnings from minerals.

There is a peculiar situation with these exports which, while being very valuable, are quite negligible in terms of the transport output. This duality of mineral exports should be therefore borne in mind.

The transportation impact of mineral exports will thus vary from one commodity to the other.

The plans of the Ghana Bauxite Company call for the increase of the output of up to 1,200,000 tons by 2010, and 3-4,000,000 thereafter. If these plans materialize, then the impact of this increase on the rail transport and Takoradi port facilities would be substantial. It does not seem feasible in the nearest future that the Ghanaian transport system will be able to handle bauxite exports in excess of, say, 2,000,000 tonnes a year. Heavy investment in the rail and port infrastructure is indispensable. Stakeholders are aware of the inadequate transport facilities for mineral exports and it is understood that a ports master plan is currently being updated on behalf of the Ministry of Transport and Ghana Ports and Harbours Authority.

Ghana Manganese Company faces similar transportation problems. Predominance of rail transport from the mines to Takoradi is a fact but, as in the case of bauxites, GRC is unable to handle any increase in volumes carried. Heavy investment in Ghana's rail system thus seems inevitable.

There remains the issue of the new oil industry scheduled to start production later this year or in 2010. However, transport issues for oil shipments are quite different from dry- bulk cargoes and involve dedicated ships (tankers), as well as loading facilities. Much will also depend on how the production will be commercialized and how much oil and gas will be consumed domestically⁵. Issues relating to liquid cargoes, both petroleum and other types of liquid cargoes are covered in a separate chapter of this document.

6. Conclusion

Mineral production and exports from Ghana impact the transport output in a somewhat peculiar way. On one hand, these exports are the main provider of a much needed foreign exchange, while on the other they affect the transport system in a disproportionate way with regards to export income.

While gold and other precious minerals account for 95 per cent of export earnings, their impact on the present and forecast demand for transport is insignificant.

⁵ The oil revenue issue is a highly politically sensitive issue. The Study Team are not expected to get involved into this discussion. Please refer to: Prempeh Akwasi: Ghana: The Oil Find in the country. "African Path Newsletter", February 19, 2009.

The remaining 5 per cent translate into volumes of 2-3,000,000 metric tonnes or more and constitute quite a challenge for Ghana's transport system. These exports may well reach a volume of 4-5,000,000 tonnes by the year 2025. Unless the transport system is significantly upgraded, Ghana will face an acute problem of insufficient transport capacities to handle these exports which, while limited in value, represent sizeable volume for rail and port operations.

Prospects of mineral exports from Ghana seem good, despite the current world-wide recession and the falling commodity prices. But they involve definite transport-related issues and in particular the inadequate rail services and cargo handling facilities in the country's seaports, especially at Takoradi.

The Government is fully aware of the importance of the mineral sector for Ghana's economy. It wishes to secure the continued development of a strong mining sector. Several major objectives for this development have been identified, and in particular:⁶

- Diversification of the country's export base in order to increase the foreign exchange earnings;
- Generation of tax revenues used to support development;
- Generation of skilled employment;
- Creation of demand for local goods and services;
- Contribution to the development of infrastructure;
- Production of raw materials for local use;
- Contribution to the transformation of local communities;
- Establishment of a catalyst for wider investment in the economy.

These, and other objectives, warrant the establishment of a new mineral policy to replace the outdated Minerals and mining Law, 1986.

⁶ National Mining..op.cit; p.5

Chapter 3 Timber industries and exports in Ghana

1. Forestry in Ghana

Forests cover about 38 per cent of Ghana's total area of 23.85 million ha, i.e. 9.17 million ha. Forestry in Ghana accounts for some 6 per cent of the nation's GDP and 11 per cent of export earnings. It gives employment to a labour force some 100,000 strong⁷.

Ghana's forest reserves are roughly divided into the High Forest Zone in the south and the Savannah Zone in the north. Within the high forest zone some 21 per cent (1.76 million ha) are permanently protected. Agriculture and human settlement are not permitted within the reserves. Some 130,000 ha in the Forest Reserves are under the jurisdiction of the Wildlife Division as protected areas⁸.

It is noteworthy that in the early 1990s only about 1.6 million hectares (ha) of "intact closed forest" were remaining in Ghana, fast depleted by a very high rate of deforestation. The annual rate of deforestation peaked at some 22,000 ha in the 1980s, and although it has subsequently been considerably reduced, it still poses a serious threat to Ghana's forestry reserves. In the mid-1990s, the total exports of timber and timber products reached close to 1,000,000 m³, twice the current level of some 500,000³. This decline in production and exports has been the result of international pressures, e.g. the action by EU to force Ghana to better manage its forestry resources⁹.

The composition of intact tropical forest reserves in Ghana are shown below (Table 3).

⁷ FAO country report- Ghana. February 2009, p.2

⁸ Idem, p.1

⁹ Following the Earth Summit in Rio de Janeiro (1992) certain European countries had unilaterally restricted imports of tropical timber. As a result, the International Tropical Timber Organization (ITTO), of which Ghana is a member, launched its Target 2000 to ensure that all trades in tropical timber will come from sustainably managed forests by 2000. During the meeting on May 19, 2009 at the Forestry Commission the Study Team were informed that while Ghana does no longer export logs from reserves, export of planted logs is not prohibited. Irregularities do, however, take place and occasional disputes over timber exports from Ghana to EU erupt.

Table 3 : Area of intact tropical forest resources in Ghana

Type of Forest	Area ('000 ha)	Percentage
Timber Production	762.40	47.00
Permanent Protection	352.50	22.00
Convalescence	122.20	7.50
Conversion	127.00	7.80
Not inventoried	270.00	16.0
Total reserve area	1,634.10	100.00

Source: FAO: Forest Service Division; after: Introduction and Status of the Forestry Sector in Ghana, FAO Country Report, Ghana, op.cit.

Some of the species, such as **scarlet species**, are under imminent threat of economic extinction. **Red species** are those which, at the current rate of cutting, face danger of economic extinction. On the other hand, **pink species**, although significantly exploited, do not represent, as yet, cause for concern.

The **promotable pink** is the only specie suitable for increased exploitation because of its ecological abundance and economic potential.

Out of the total number of some 300 species inventoried in Ghana, only about 1/5 (60 species) can be classified as being of commercial interest. The total standing volume (all species combined) is estimated at some 188,000,000m³. Out of this volume the Annual Allowable Cut (AAC) was established at 1,200,000 m³.

This level of AAC had been subsequently found to be unsustainable and was reduced. Table 4 below illustrates the total sustainable yield from reserves.

Table 4 : Total annual sustainable yield from forest reserves in Ghana

Species Group	No of Stems	Volume('000m ³)
Scarlet	5,460.00	115.60
Red	15,300.00	208.70
Promotable Pink	38,660.00	358.50
Total	59,420.00	683.10

2. Production levels and stocks

In Ghana wood is used for domestic consumption and for exports. It is estimated that some 14,000,000 m³ are consumed annually for energy purposes only. This volume may increase to 20,000,000 m³ by the end of the present decade.

About 70 per cent of urban households in Ghana use charcoal for cooking and heating purposes. The annual *per capita* consumption is around 180 kg. One third of the total consumption of charcoal is in the greater Accra metropolitan area¹⁰.

Charcoal production is concentrated in the transition zones between the forest and the savannah woodlands. Most of the wood comes from felling of the savannah trees and from logging residues. It is estimated that as much as 91 per cent of the total round wood production in Ghana is used as fuel wood and charcoal, the remaining 9 per cent being used as industrial round wood¹¹.

In the context of the present Project the forestry industry in Ghana offers a wider range of transport-related issues. While the fuel and charcoal wood is moved mainly between the production and consumption areas in rather limited lots (small truck loads of fuel wood), the exports of Ghanaian timber and wood products are unevenly distributed among as many as 67 different countries throughout the world and involve both land and maritime transport. These aspects of transport relating to timber exports will be dealt with in greater detail later in this report.

With exports totalling some 530,000 m³ in 2007 Ghana is not among the top timber exporting countries. But the country is gradually gaining importance as a supplier of much demanded tropical plywood and veneer.

Export of logs being now banned, the Government encourages export of wood products. On average 1 m³ of timber and plywood is worth twice as much as the same volume of logs. For other wood products the increase in value-added is even more pronounced; furniture, floor covering earn six times more than the cubic equivalent of logs.

But the further expansion of wood processing industries faces some major constrains. There is, for instance, a growing international demand for kiln-dried products but that demand cannot be met due to lack of sufficient kiln capacity. Kiln drying cannot be substituted with air drying since air-dried wood tends to destabilize over time and its usefulness is thus compromised¹².

Irregular and fraudulent practices are also a major problem in the forestry economy in Ghana. There is evidence of illegal cutting, defrauding of funds earmarked for the forestry industry and of other illegal practices. These issues, however, are beyond the main thrust of this paper.

Origins of wood exports from Ghana are highly dispersed. As many as 300 exporters operate in this business but the ten largest companies control 58 per cent of the exported volumes and 55 per cent of their value.

¹⁰ FAO: Country Report; op.cit; p. 5

¹¹ Idem

¹² N.L.Clark: Forestry in Ghana. A Country Study. Library of Congress, Federal Division 1994.

3. Timber exports from Ghana 2002-2008

Table 5 that follows illustrates the evolution of timber exports in Ghana since 2002.

Table 5 : Timber and wood products exports from Ghana in the years 2002-2008

Volume of Exports	2002	2003	2004	2005	2006	2007*	2008**
Value of Export(US\$ million)	182.70	174.70	211.70	226.50	199.50	250.10	265.70
Volume ('000 m ³)	472.40	445.90	454.50	466.20	454.60	531.80	573.50
Unit Price (\$/m ³)	386.80	391.90	465.80	486.00	439.00	470.30	462.90

* Provisional

** annualized on the basis of the first three quarters of 2008

Source: Study Team's computations from Bank of Ghana and the International Tropical Timber Organization market report

Table 6 below illustrates the evolution of timber and wood exports in terms of their value, volume and unit price during the years 2002-2008.

**Table 6 : Trends in timber and wood products exports from Ghana 2002-2008
(2002=100)**

Volume of Exports	2002	2003	2004	2005	2006	2007*	2008**
Value of Export(US\$ million)	100.00	95.60	115.90	124.00	109.20	136.90	145.40
Volume ('000 m ³)	100.00	94.30	96.20	98.70	96.20	112.60	121.40
Unit Price (\$/m ³)	100.00	101.30	120.40	131.80	113.50	121.60	119.70

* Provisional

** annualized on the basis of the first three quarters of 2008

Source: Study Team's computations from Bank of Ghana and the International Tropical Timber Organization market report

On the basis of data one can conclude that there has been a 19.7 per cent increase in the unit price of timber and wood product exports during the period under review. The volume of exports increased by 21.4 per cent over the corresponding period of time, while the value has appreciated by 45.4 per cent. There have however been marked fluctuations in terms of volumes exported, with their downward trend in the years 2003 to 2006. They subsequently recovered in 2007.

The European Union is the main destination of Ghana's forestry exports taking over 45 per cent of their volume. The US absorbs 9 per cent while the balance (46 per cent) goes to over 65 countries worldwide.

A new trend is exports to the neighbouring countries of ECOWAS. These shipments include basically such species as ceiba, chenchen and mahogany. The volume of these trades

reached almost 105,000m³ during the first nine months of 2008. Road transport is the main mode for these trades. More discussion on transportation aspects follows further in this paper.

Changes in price of major wood products exported from Ghana are shown in the table below.

Table 7 : Changes in volume and value of timber and wood products exports from Ghana in the first nine months of 2008 and the corresponding period in 2007

PRODUCT	Jan-Sept 2007		Jan-Sept 2008		% Change	
	Vol(m3) ('000)	Value(EUR) (million)	Vol(m3) ('000)	Value(EUR) (million)	Vol(m3) ('000)	Value(EUR) (million)
Sawn Timber:						
Lumber(AD)	65.69	19.62	57.24	16.07	-12.90	-18.10
Lumber(KD)	87.58	34.36	91.35	36.00	4.30	4.80
Veneer:						
Sliced Veneer	28.04	23.12	31.85	25.46	13.60	10.10
Rotary Veneer	23.17	5.42	24.91	6.08	7.50	12.20
Curl Veneer	0.17	1.67	0.11	1.04	-35.30	-37.70
Plywood	96.52	26.09	104.96	30.35	8.70	16.30
Furniture Parts	0.23	0.46	0.04	0.07	-82.60	-84.80
Mouldings	21.95	9.49	19.30	8.75	-12.10	-7.80
Boules (AD+KD)	4.96	2.48	3.24	1.62	-34.70	-34.70
Parquet/Flooring	1.92	1.84	1.96	1.49	2.10	19
Other wood Products	69.15	14.01	95.14	17.48	37.60	24.80
TOTAL	399.38	138.56	430.10	144.41	7.70	4.20

Source: Ghana's Timber Export Statistics, January- September 2007-2008

Some disturbing trends appeared in the first three quarters of 2008. While the total exports increased by 7.7 per cent during the period under review and the revenue grew by 4.2 per cent, it was achieved through larger volumes recorded for sliced veneer (+ 13.6 per cent), plywood (+ 8.7 per cent), rotary veneer (+ 7.5 per cent) and kiln-dried veneer (+ 4.3 per cent). Record drops occurred, however, in furniture parts (-82.6 per cent), curl veneer (-35.5 per cent) and boules (-34.7 per cent), viz. the items which represent high added-value levels. Simultaneously air-dried timber shipments dropped by almost 13 per cent¹³.

Plywood, kiln-dried lumber, air-dried lumber, sliced veneer and rotary veneer accounted for almost $\frac{3}{4}$ of the total volumes exported during this period, leaving little room for more processed products. This is a somewhat negative trend which does not auger well for the future of lumber and wood products exports from Ghana.

¹³ Tropical Logs and Sawn-wood Market Report; op.cit;p.3

Quality of products is one of the reasons for this decline. The Ghanaian timber and wood industry features an overcapacity of obsolete and inefficient equipment incapable of making high quality end-products. There is a total of over 40,000 small scale carpenters registered with the Association of Small Scale Carpenters of Ghana. They represent the largest group of end users of raw wood and consume annually nearly 220,000 m³ of sawn wood, some 75 per cent of the domestic timber requirements¹⁴.

Generally speaking the end users of domestic timber include the following entities:

- Small-scale furniture manufacturing companies
- Truck body builders
- Boat builders
- Pallet and crate manufacturers
- Construction companies
- Overland wood products exporters
- Wood carvers (handicraft)
- Railways

The list above excludes consumers of fire wood and charcoal referred to earlier in this paper.

4. The impact of the forestry in Ghana upon the country's transport system

Unlike the minerals, timber and wood product exports from Ghana are not totally seaborne. During the first nine months of 2008, overland timber and wood products shipments from Ghana to Nigeria, Burkina Faso, Niger and Togo Reached 104,960m³, a 8.7 per cent increase over the corresponding period of 2007.

The above exports are almost exclusively handled by road with practically no modal choice available to ECOWAS states.

There are other emerging markets for Ghanaian wood exports. India, Malaysia (herself one of the world's leading wood products exporter), Taiwan, Singapore and Thailand, together with the Middle East countries (Saudi Arabia, Lebanon, UAE and Israel) accounted for 21.4 per cent of Ghana's forestry products exports in the first nine months of 2008. Unlike the exports to ECOWAS the latter trades are exclusively seaborne.

In the context of the present Project, and in particular for the purpose of freight transport forecasting, forestry exports, which are usually expressed in volume (cubic metres or an old shipping measure – the Petersburg standard), should be converted to weight (tonnes).

There are two different measures in relation to transport of wood by sea and by land. The former is principally concerned with volume, while the latter with weight due to axle load constrains. But in either case **density ratios** play a significant role.

In sea transport timber in bulk is usually considered a measurement cargo¹⁵ and *ipso facto* has a direct impact on the level of freight charges. Most of freight contracts stipulate that a specific rate will be charged on either the volume or weight, "whichever the greater".

¹⁴ Introduction and Status....op.cit; p.7

¹⁵ Measurement cargo stows in excess of 40 cubic feet to a tonne. Woodchips (not exported from Ghana) stow in excess of 100 cf/ tonne.

Table below illustrates varying densities of particular wood species, both tropical and tempered climate wood.

Table 8 : Densities of various wood species in kg per 1.00 m³

Wood-seasoned & dry	kg/cu.m
Afromosia	705
Apple	660 - 830
Ash, black	540
Ash, white	670
Aspen	420
Balsa	170
Bamboo	300 - 400
Birch (British)	670
Cedar, red	380
Cypress	510
Douglas Fir	530
Ebony	960 - 1120
Elm (English)	600
Elm (Wych)	690
Elm (Rock)	815
Iroko	655
Larch	590
Lignum Vitae	1280 - 1370
Mahogany (Honduras)	545
Mahogany (African)	495 - 850
Maple	755
Oak	590 - 930
Pine(Oregon)	530
Pine(Parana)	560
Pine(Canadian)	350 - 560
Pine(Red)	370 - 660
Redwood(American)	450
Redwood(European)	510
Spruce (Canadian)	450
Spruce (Sitka)	450
Sycamore	590

Source: Barthold Technologies. Density of Wood January 2009

It would be wrong, however, to identify **density factors** with **stowage factors** as the latter refer to wood as a cargo and not as a material, and as such must allow for the space lost in stowage operations (dead stowage) when the cargo is loaded into a ship's hold or a container, or any other vehicle for that matter.

For overland transport purposes, however, and in the context of this Project, weight is as important as is the volume. Estimates had to be made inasmuch as the tonnage of wood transported within and without Ghana is concerned, but it should be borne in mind that density factors for tropical wood vary substantially; from 170 kg/m³ for **balsa wood** to 1,280-1,370 kg/m³ for **lignum vitae**, that is by the factor of almost 8:1.

Furthermore, plywood or veneer products will have different density factors compared to raw wood. It is thus extremely difficult to come up with one average for all species for the conversion purposes. However, excluding the extreme cases on both ends: balsa and lignum vitae, a density of 600 – 750 kg/m³ does not appear unreasonable. As a result a density factor of 1.7 – 1.3 m³/ tone could be used as a benchmark. The results of this conversion exercise are shown in table below.

Table 9 : Volume and weight of Ghana's forestry exports 2002-2008: Land and sea transport

Year	Total exports (1000 m3)	of which * *		Conversion to weight ***	
		Land transport	sea transport	Land transport	sea transport
2002	472.40	118.10	354.30	78.70	236.20
2003	445.90	111.50	334.40	74.30	222.90
2004	454.50	113.40	340.90	75.70	227.30
2005	466.20	116.60	349.60	77.70	233.10
2006	454.60	113.60	341.00	75.70	227.30
2007	531.80	133.00	398.80	88.70	265.90
2008*	573.50	143.40	430.10	95.60	286.7

Source: Study Team's own computations

Notes:* Annualised on the basis of the first three quarters of 2008

** Split as follows: 25 percent land transport and 75 percent sea transport

*** Average density of 1.5m³/ tonne

Data in table above indicate that the total figures for timber and wood product exports vary between 450- 570,000 m³, and some 300 – 400,000 tonnes. Compared to mineral exports, for instance, these are small volumes and quantities.

Bearing these figures in mind, forestry exports from Ghana do not seem to be a major commodity group that will impact demand for freight transport within the next 10-15 years. It is noteworthy that forestry products exports peaked at nearly 1,000,000 m³ in 1994. It is most unlikely that will resume this level within the forecasting period for this Project.

Environmental policies and declining AAC limits are the factors that will keep the forestry output in Ghana on a rather downward trend. What will change is the structure of timber and wood products trades. They will include an increasing proportion of higher added-value items. So will the degree of containerization increase, since the main export items, such as plywood or veneer are quite suitable for unitization?

There remains, however, the unquantifiable volume of wood used for cooking and heating purposes. Estimates put this volume at some 20,000,000 m³ by the end of the present decade.¹⁶ This is approximately 40 times more than the total volume of exports of timber and wood products.

In terms of weight that represents a somewhat lesser tonnage since charcoal, which has a low density factors because it does not contain water, is the predominant form of fire wood. One still deals with some 4-5,000,000 tonnes of cooking and heating wood that has to be moved around.

It should be remembered that much of this wood is moved using the NMT (non-motorized transport) modes: horse-pulled carts, bicycles or head-carrying. These modes of transport considerably reduce demand for the for-hire transport in Ghana.

Even without detailed traffic forecasting models one can expect that the timber and wood products transport in Ghana will most likely follow a downward trend. Deforestation, switching to electricity, LNG and LPG etc., will reduce demand for fire wood and consequently demand for transport thereof. Export volumes will be determined by the market and there are already some indications that shipments of timber and wood products are following a declining trend.

5. Conclusion

The current state of the forestry economy in Ghana: AAC, domestic consumption, exports, firewood consumption indicate that there will be less wood moved in Ghana. The reasons for that are the following:

¹⁶ In their "*Strategic National Energy Plan 2006-2020*" of July 2006, the Energy Commission of Ghana forecast the consumption of wood fuels at 25-31 million tonnes in 2008, 29-35 million tonnes in 2015 and 40-50 million tonnes in 2020. See: National Energy Commission: Energy Demand Sector of the Economy. June 2006, p.39. The ITPG Study Team are of the opinion that such volumes of wood fuels are unsustainable.

- Timber and wood products exports are not likely to increase very much in volume; they will rather change their form from raw wood to a higher added-value items such as furniture, plywood and various forms of veneer;
- Cooking and heating fuels will increasingly shift to electricity and LNG/LPG. The current situation in which up to 70 per cent of cooking and heating in Ghana is made using charcoal and fire wood is neither sustainable nor economically justifiable;
- Forestry policy in Ghana will exert definite impact not only on the output, consumption and export of timber and wood products, but also on the way this natural resource is going to be managed. Pressure from importing countries, and in particular the European Union, will focus on forest preservation.

The Government of Ghana has defined the policy objectives in its *Forest and Wildlife Policy of Ghana*¹⁷. These objectives will have a direct impact upon forestry exploitation and, by extension, on the overall demand for transport generated by the forestry sector. The objectives are as follows:

- Manage and enhance Ghana's permanent estate of forest and wildlife resources for preservation of vital soil and water resources, conservation of biological diversity and the environment and sustainable production of domestic and commercial produce;
- Promoting the development of viable and efficient forest-based industries, particularly in secondary and tertiary processing, so as to fully utilize timber and other forest products and wildlife resources to satisfy domestic and international demand for competitively priced quality products;
- Promoting public awareness and involvement of rural people in forestry and wildlife conservation in order to maintain life-sustaining systems, preserve scenic areas and enhance the potential of recreation, tourism and income generating opportunities;
- Promoting research-based and technology-led forestry and wildlife management, utilization and development to ensure resource sustainability, economic growth and social progress and protection of natural environment;
- Developing effective capability at national, regional and district levels for sustainable management of forests and wildlife resources.

These objectives notwithstanding, Ghana's forest resources and their utilization will also be shaped by the hard core economic factors. At the moment, wood exports are among the few exportable resources from Ghana, such as minerals, cocoa and a handful of other products. Bearing in mind the very difficult situation of the country in terms of its current account deficit, and the alarming level of trade deficit, timber exports from Ghana will continue for some time to come. Their substitution with higher added-value items such as furniture and other wood products will require considerable investments in order to render these exports competitive on international markets.

¹⁷ See: Ministry of Lands and Forestry, September 1995

Chapter 4 Cocoa production and Exports in Ghana

1. Introduction

Cocoa beans and their derivatives are the second foreign exchange earner after gold and diamonds. In 2008 Ghana earned some US\$ 1.5 billion from cocoa exports. Gold and diamond exports brought US\$ 2.25 billion¹⁸.

Cocoa production and exports will continue to play a major role in the Ghanaian economy and the prospects for this sector look rather good. The output could rise to 1,000,000 tonnes a year by the 2010/2011 seasons thanks to increased use of fertilizers and disease control¹⁹. The current average level of production is approximately 680,000 tonnes, although the 2008/9 season's output was down by some 14 per cent.

Ghana is a major producer and exporter of cocoa and enjoys good reputation for the quality of its produce. Increasingly, the country is moving towards processing of cocoa beans to increase the value-added component of exports. In 2007 exports of cocoa products earned US\$ 157 million, i.e. 14 per cent of total export earnings from this commodity. On average cocoa products such as cocoa paste, cocoa butter, confectionery, powder and chocolate fetch higher unit prices compared to cocoa beans (on average 15-20 per cent).

2. Overview of the cocoa production sector in Ghana

Ghana is the world's second largest producer of cocoa, after Cote d'Ivoire, with a 17.2 per cent share of the world production (Cote d'Ivoire – 40.7 per cent)²⁰. Table below shows the evolution of cocoa production worldwide during the 2002/03 – 2006/07 seasons.

¹⁸ Figures on gold production and exports vary from one source to another. The latest statistics state that revenue from mineral exports was US\$ 2.3 billion in 2008, compared to US\$ 1.79 billion in 2007. See: Mining contributes 43 per cent of Ghana's export revenue." *Graphic Business*" June 2-8, 2009, p.5

¹⁹ See: Ghana: Cocobod Eyes Bigger Cocoa Crop. "Food Industry News", March 18, 2009

²⁰ World Cocoa Foundation: Cocoa Production Statistics, March 2009.

Table 10 : World cocoa bean production ('000 tonnes)

Country	2002/03	2003/04	2004/05	2005/06	2006/07
World	3,232.00	3,651.00	3,446.00	3,731.00	3,388.00
West Africa	2,195.00	2,620.00	2,397.00	2,622.00	2,302.00
Cameroun	152.00	160.00	190.00	173.00	175.00
Cote D'Ivoire	1,367.00	1,550.00	1,410.00	1,519.00	1,380.00
Ghana	498.00	736.00	591.00	740.00	582.00
Nigeria	178.00	174.00	206.00	190.00	165.00
Sub-Total Africa	2,234.00	2,658.00	2,438.00	2,666.00	2,347.00
Americas	500.00	445.00	439.00	439.00	431.00
Asia	498.00	548.00	569.00	626.00	610.00

Source: World Cocoa Foundation: Cocoa Production Statistics 2002-2007

Several factors contribute to cocoa being the major cash crop in the Ghanaian agricultural economy. Firstly, world demand for cocoa beans and their derivatives is likely to remain strong, even in today's recessionary conditions. The reason for that is that there are only a handful of cocoa producing countries: Cote d'Ivoire, Ghana, Brazil, Ecuador, and Indonesia. On the whole the West African countries had a 70 per cent per cent share in world's cocoa output. However Ghana lags behind Cote d'Ivoire, the leading cocoa producer and exporter, by a factor of 2.4:1. The cocoa growing is and will remain for the foreseeable future, one of the main export earning commodities in Ghana.

Secondly, high demand for cocoa is driving the prices up. Between 2002 and 2008 the price of a tonne of cocoa beans increased from US\$ 1,260.5 to US\$ 2,588.0, i.e. by a whopping 105.3 per cent (see data in table below). It is worthwhile mentioning that in 2003 this price grew by almost 55 per cent. Poor crops, disruption of shipments due to unrest in Cote d'Ivoire, strong demand contributed to this surge in prices in the span of one year.

Table 11 : Prices of cocoa beans in the years 2002-2008

Unit Price of Cocoa Beans		
Year	Unit Price (US\$/tonne)	2002=100
2002	1,260.50	100.00
2003	1,945.50	154.00
2004	1,586.90	125.00
2005	1,524.50	120.90
2006	1,584.10	125.70
2007	1,779.50	141.20
2008*	2,588.00	205.30

* Futures prices at the New York Mercantile Stock Exchange, as of January 2009

Source: Years 2002-2007 after: ISSER: The State of the Ghanaian Economy 2007, p.105

The latest surge in cocoa prices in Table 11 is probably unsustainable²¹ at this time of the worldwide recession, but high prices are a very strong stimulus for cocoa growers in Ghana and elsewhere.

Cocoa farmers in Ghana receive a "at the gate price" of approximately 52 per cent of the f.o.b price of exported product. That would translate into approximately US\$ 1,346 a tonne or Gh¢ 1,827 a tonne at the latest rate of exchange.

Thirdly, recent medical studies show that cocoa products, and especially some types of chocolate, have definite health benefits. That may cause demand for cocoa remain high in the foreseeable future.

But cocoa production in Ghana faces several constraints. Growth in production has been driven by land expansion and increased use of labour rather than by improved productivity.²² Further expansion of cocoa production in Ghana can only be attained either through extension of acreage or through increased yields.

Yet recorded yields are estimated at some 50-75 per cent of potentially available yields, according to FAO and the Ministry of Food and Agriculture²³.

Extensive rather than intensive cocoa production has been the reason behind the recent growth in output. But extensive agriculture in Ghana faces a major challenge from declining acreage. Cocoa production occupied some 2,000,000 ha in 2004 but this acreage has

²¹ According to Bloomberg the price of cocoa beans at the New York Stock Exchange was only US\$ 1,906.00 on April 6, 2009, a US\$ 655.00 drop within one week. It has subsequently recovered.

²² See: J. Gockowski: Cocoa production strategies and the conservation of globally significant rainforest remnants in Ghana. "Overseas Development Institute and International Food Policy Research Institute". Accra. November 2007.

²³ See: M.R. Appiah;et al. Evaluation of fertilizer application on some peasant cocoa farms in Ghana. After: C.Breisinger et al: The Role of Cocoa in Ghana's Future Development. GSSPBackground Paper 11. January 2008.

subsequently declined to around 1,800,000 ha (2006 figures)²⁴. Some 25 per cent of cultivable land in Ghana is used for cocoa production.

This culture has definite climatic requirements and the majority of remaining land in the Northern parts of Ghana is not suitable for cocoa plantation.

All in all the cocoa culture in Ghana relies on definite climatic conditions and agronomy and it looks like the future expansion of this crop may face some difficult barriers to overcome. It does not seem feasible at this stage that the target of 1,000,000 tonnes of cocoa in the 2010/2011 season can be attained, unless considerable improvement in productivity is achieved.

Last but not least is the issue of cocoa smuggling. It is believed that prices differentials between Ghana and its neighbours, and in particular Cote d'Ivoire, could have been a factor in a rapid growth of output in recent years.

All the above factors combined, the cocoa production in Ghana is subject to considerable year on year variations as can be seen from table below.

Table 12 : Evolution of cocoa production in the seasons 1992/93 to 2005/2006

Year(crop season)	Crop('000 tonnes)	1992/93=100
1992/93	312.00	100.00
1993/94	354.70	113.70
1994/95	309.50	99.20
1995/96	403.90	129.50
1996/97	322.50	103.40
1997/98	409.40	131.20
1998/99	397.70	127.50
1999/00	436.60	139.90
2000/01	389.80	124.90
2001/02	340.60	109.20
2002/03	496.80	159.20
2003/04	736.60	236.10
2004/05	601.90	192.90
2005/06	740.40	237.30

Source: ISSER: The State of the Ghanaian...op.cit; p.120

There are some discrepancies in the statistics included in the above table and those in Table 10 presented earlier but they are rather insignificant.

Figures in the table above reveal a few interesting trends. After a rather depressing period in cocoa culture in the 1990s and the early 2000s, one can observe a few cases of soaring crops: 2002/3, 2003/04 and, after a year on year decline in the 2004/05 season when the production fell by 18.3 per cent, another surge of 23 per cent in the season 2005/2006.

²⁴ See: C.Breisinger: op.cit, p.4

According to the latest figures provided by the Cocobod, the purchases of cocoa beans in the season 2007/2008 amounted to 680,203 tonnes. That figure stands in contrast with the latest published statistics which put the cumulative cocoa purchases in the main crop season 2007/2008 at 663,800 tonnes (2.4 per cent less compared to the former figure)²⁵. Cumulative cocoa purchases so far for the main crop season 2008/2009 were only 508.0 thousand tonnes, against the forecast of 600,000 tonnes²⁶.

The latest statistics on cocoa production not only indicate considerable variations on year output but they also cast some doubt on their reliability. Furthermore, they suggest that the goal of 1,000,000 tonnes in the 2010/2011 crop season may be more remote than expected.

The Study Team have been unable to identify and quantify the genuine reasons behind these high fluctuations in cocoa output. It is suggested that the 18.3 per cent drop in the season 2003/04 is attributable to insufficient rainfall²⁷. But it may as well be the result of the stabilization of the political situation in Cote d'Ivoire and the end of smuggling operations that inflated Ghana's cocoa output in previous years. The real causes for these fluctuations may never be revealed and, the task of finding out falls outside the mandate for the ITPG Study Team.

3. Cocoa exports from Ghana

Cocoa exports provide the second largest source of export earnings in Ghana after gold and diamonds. The accounted for 1/3 of foreign exchange revenue from export activity in the country, bringing around US \$ 1.2 billion.²⁸

Table 13 : Cocoa exports 2002 – 2006 (US\$ million)

Item	2002	2003	2004	2005	2006
Total Cocoa Exports	474.40	817.70	1,025.00	908.40	1,187.40
Cocoa beans	392.50	691.60	984.40	818.50	1,041.10
Volume('000 tonnes)	311.40	354.80	620.40	536.90	657.20
Unit Price(US\$/tonne)	1260.50	1949.50	1,586.90	1,524.50	1,584.10
Cocoa Products (Value)	81.90	126.10	41.20	89.90	146.40
Volume('000 tonnes)	59.00	48.50	21.10	42.90	78.70
Unit Price(US\$/tonne)	1,387.00	2597.80	1,950.20	2,097.00	1,860.20

Source: ISSER: The State of the ...op.cit; p.93

²⁵ See: "Graphic Business" of May26-June 1, 2009, p.4

²⁶ Idem, p.4

²⁷ ISSER: The State of the Ghanaian....op.cit; p.119

²⁸ The latest statistics (see: "Graphic Business"; op.cit) quote US\$ 1,501.7 million in export revenue from cocoa beans and products, an increase of 32.6 per cent over the previous year. Such an important increase, despite the reduced quantities (see earlier figures) has been possible thanks to high prices for the produce. While, according to Bloomberg (New York Mercantile Stock Exchange), the prices for the cocoa beans fluctuate (US\$ 2,305.0/tonne on May 18,2009, compared to US\$ 2,722.0/tonne on February 2,2009) they remain strong, despite the current recession.

Interesting conclusions can be drawn when comparing data in table above with those in Table 11:

- In physical volume (tonnes) exports exceeded production by almost 5 per cent in 2005 and 13 per cent in 2007, the reasons for that being that the reporting period for production and exports is not the same. Moreover, exports can be made using stocks from the previous crop. But a very plausible explanation is that smuggled cocoa from the neighbouring countries could have made up for the difference between the crop and the volume exported for any given year.
- On average, for the period 2002-2007 about 2/3 of the crop is being exported but this average is rather erratic and varies between the low of 62.5 per cent in 2002 to a high of 112.9 per cent in 2007.
- Processing may be another reason for the difference between the volumes produced and exports. Ghana has ambitious plans to process up to 500,000 tonnes of cocoa beans in order to increase the value-added component of the cocoa output. If these plans become reality, then the overall pattern of transport routes of cocoa, from the farm gate to the seaport, will have been altered.

Unlike the minerals, however, revenue earning function of cocoa culture is sustainable over long periods of time because of its renewable nature. Furthermore it is more accessible to the population at large who, unlike gold mining reserved to a limited number of companies, can relatively easily start cocoa plantation, provided they own or lease land suitable for this culture.

But is Ghana taking total advantage of this natural wealth? The answer is rather negative. Several factors are responsible for that. Here are some reasons.

Firstly, the cocoa yields in Ghana are lower than in other producing countries, Cote d'Ivoire in the first place. To increase yields not only agro-technology must change (more mechanised work, better fertilizers, better disease control, etc), but the structure of farming has to undergo far reaching changes. In Ghana, unlike in the neighbouring Cote d'Ivoire, let alone Indonesia, Malaysia or Brazil, the bulk of production comes from small and very small holdings. Not only are these estates not productive but their sheer dispersal makes it difficult to transport the crops to the nearest exporting or processing plant²⁹. High transport costs reduce the farmers' earnings and undermine profitability of production.

Secondly, the totality of cocoa exports, which are almost exclusively seaborne, is controlled by foreign shipping. The exporters do not take advantage of controlling the ocean transport of cocoa, selling f.o.b instead of c.i.f. The price obtained at overseas markets is thus an f.o.b price, i.e. representing the value of the merchandise only.

Thirdly, as with any natural resources, export prices are much lower for raw beans compared to products made from cocoa beans. One look at figures in table above indicates that cocoa products obtain much higher unit prices compared to cocoa beans.

But the future of this industry in Ghana will be determined by the world demand for cocoa. At this time all indicates that this demand will remain strong. But will it be sustainable 5, 10 or 20

²⁹ During their meeting at the Cocoaboard on May 7, 2009, the Study Team were informed that the single, most important bottleneck in the transport chain of cocoa beans is the evacuation of the produce from the fields. The reasons for that are: small size of estates, lack of access roads to plantations, insufficient mechanization (lack of tractors), large distances to the points of collecting(societies).

years from now? The answer to this question is anybody's guess. While medical research (see above) indicates health advantages of consuming cocoa products, these are also highly caloric. In the US, where 30-40 per cent of the population is overweight, there are strong trends to reduce consumption of chocolate and other cocoa products. In some countries (EU), there are norms reducing the cocoa contents in chocolate, sweets and other items. All in all these trends may reduce the overall demand for cocoa and, consequently, its production. Rather interestingly, the world cocoa production increased by less than 5 per cent between 2002 and 2007. Although this insignificant growth may be attributable to climatic factors, diseases³⁰ and other causes, it may as well be a result of the declining world demand for cocoa in long term.

4. Cocoa production and exports and the transport industry in Ghana

Transportation is one of the main issues as far as the current state and the future of the cocoa industry in Ghana is concerned. The popular wisdom has it that transport constraints are the major reasons for the cocoa production sluggish growth in recent years.

Transport issues in relation to cocoa production and exports involve the following aspects:

- Transport of the harvest to the points of collecting the kernels, bagging and unitization (pallets)
- Transport of produce to grinding facilities
- Transport of bagged or unitized cargo to Tema and Takoradi for containerization
- Preparation(stuffing) of containers for shipment
- Loading of containers aboard container ships for overseas transportation

The Study Team believe there are no direct shipments of containers loaded with kernels from the producer's premises to seaports and almost all the containers are stuffed in port.

There are no distinct port statistics showing cocoa transshipments. This cargo appears under three different heading in GPHA statistics: 1) general cargo, 2) bagged cargo and 3) containers.

It would not be unreasonable to claim that most cocoa shipments from Tema and Takoradi are containerised for the simple reason that the consignees require this mode of transport at the receiving end. Most cocoa importers are big international corporations such as Nestle, Unilever, Suchard, etc, who are well equipped to handle containers.

The 2007 volume of exports being 657,000 tonnes, and the average 20 TEU container taking 18-20 tonnes of bagged cocoa beans, that would translate into something of a range of 32 - 35,000 s. Assuming that all that volume is containerised this would be equivalent to 12-13 per cent of the total TEUs in export.

But there are no detailed data describing the degree of containerisation of cocoa exports from Ghana. It is undoubtedly less than full containerization. It would be sheer speculation to determine the degree of containerization as it now stands.

³⁰ At some time in the past Brazil's cocoa trees were almost wiped out by disease.

Assuming that cocoa production will rise to 1,000,000 tonnes in the next couple of years, and that up to 90 per cent will be exported; the total TEUs requirements for shipping this volume would be in the range of 45-50,000 TEUs. This volume could be handled from the shipping side but there can be some problems with the shore-side operations and in particular the transfer of loaded containers between the warehouse and dedicated container berths in Tema. Takoradi has no handling equipment or dedicated berths for containers these being loaded and discharged using ships' own gear.

However, the problems with handling increased TEU volumes of containers loaded with cocoa through the country's seaports seem to be mostly of an organizational nature. Both ports handle over half a million TEUs a year so even at the increased volume of cocoa exports this traffic will represent some 15-18 per cent of containers in export, now empty to a large extent.

The core of the problem is land transport. As rail traffic in Ghana is very limited and, what is more, frequently disrupted, road transport is the only alternative. Almost in their entirety cocoa shipments by road are in bagged form. Because cocoa beans stow little (high density) an average lorry cannot load, without violating axle load limits, more than 15-20 tonnes of beans. Bearing in mind that as much as 900,000 tonnes may be shipped within the next 2-3 years that would translate into 40-50,000 truck loads a year.

Understandably, the road transport of cocoa as a truck load consignments would not require that many vehicles, their number being the function of the number of round trips made a year. Assuming the average time of operation to be 250 days a year, and the round trip time being 5 days, therefore a 15- ton truck could handle 750 tonnes a year. To carry the volume of 900,000 tonnes a year, a total of 1,200 15-ton trucks would be necessary.

Extending the time in operation to 300 days a year, increasing the average load to 25 tonnes and reducing the time of a round trip to 3 days, the calculations would be as follows:

R = To/tr: where:

R - Number of round trip per year;

To – total time in operation (300 days)

tr – time of a round trip

Substituting the values above one gets:

R = 300:3 = 100 round trips per year

At the payload of 25 tonnes per truck the vehicle will carry 2,500 tonnes. To carry the volume of 900,000 tonnes a year a fleet of 360 trucks would be required.

Simple arithmetic implies that increasing the payload, while reducing the time of a round trip, will augment the annual carrying capacity of each vehicle, while reducing the number of vehicles needed to do the job.

But operation factors come to play here. The trip duration is itself a function of distance to cover (km) and average speed. The latter is determined by road conditions and level of congestion. In Ghana both are negatively impacting the operational speed. Consequently the trip duration may be increasing.

Any slowdown in vehicle movement affects the time of a round trip which determines the vehicle's total carrying capacity. The latter tends to decline under unfavourable road condition.

Declining carrying capacity of vehicles implies that a larger numbers of vehicles would be necessary.

But speed is not the only factor. Carrying capacity of a vehicle, be it a truck, rail car, barge or ship, also depends on how well the cargo in its packaged form fits the shape of a ship's hold, or rail box. The better this fit the greater the overall carrying capacity.

Cargo handling operations have also a direct impact upon the travel time and the overall carrying capacity. The smoother the handling, the shorter the time under loading/discharge, and the greater the number of trips performed.

The above interrelationships are discussed for illustration purpose only. In real life the carrying capacity of a vehicle, particularly of a road vehicle, depends also on other factors, such as for instance accident, police, physical, sanitary and customs control, etc. It is nevertheless possible to make sensitivity tests and determine the total fleet of road vehicles necessary to handle the forecast volume of cargo; cocoa shipments on the example above. Thus, knowing the parameters required, one can calculate, with a fair degree of accuracy, the size of a fleet of vehicles necessary to serve predetermined volume of traffic.

For the cocoa industry in Ghana the crucial aspect relates to road haulage of some 900,000 – 1,000,000 tonnes of cocoa beans and products. It does not seem that this will be an overwhelming task for the road operators in this country. Some congestion may occur but it will not represent anything unusual under the current conditions of the road operations in Ghana.

5. Conclusion

The cocoa industry is a vital segment of the Ghanaian economy. It provides employment to large numbers of the rural population and brings around US\$ 1.5 billion in export earnings. Its prospects look good provided the current level of world demand for cocoa is sustained.

In terms of transportation the increased production can be handled rather well by the port and shipping side. Some problems may occur with the land transportation which will almost invariably be road haulage. But a proper organization, planning and coordination between Cocobod and the trucking industry may solve the most acute problems. Overall it does not seem that the future demand for transport of cocoa beans and products will unduly affect the transport infrastructure and operations in Ghana.

Chapter 5 Containers in Ghana's sea and land transports

1. Introduction

Containers are now the reality of life in international trade and Ghana is no exception in this area. But a full containerization, in the form of a door-to-door service, is still very much a novelty in the country and most of the half a million or so TEUs traffic is hardly that. Needless to say this situation deprives Ghanaian consignors and consignees of most of the advantages of an integrated transport chain, as it is now commonplace throughout the world.

There are several reasons for such a limited scope of containerisation in Ghana: infrastructural, operational, economic, institutional and regulatory. Transport under a through B/L is still rare and the majority of boxes are stuffed and unstuffed in ports. That deprives the end users of the flexibility of containerisation and prevents them from taking advantage of lower unit costs of transport. Shipping companies have little difficulty with silencing the critics of (presumably) high freight rates by claiming that the rates they charge to importers and exporters have to take into account the predominantly empty containers in return haulage.

But economic aspects of containerisation which, by virtue of its very nature, is multimodal, reach beyond the scope of this paper. Its main goal is to present container traffic in Ghana as an input to the modelling and forecasting exercise – one of the chief outputs from the ITPG project.

2. Evolution of container traffic in Ghana

There is an acute shortage of transport statistics in Ghana, other than those relating to physical infrastructure and vehicle registration, and containers are no exception. As sea containers are practically the only data captured in a more systematic manner, ports statistic are the only source of relevant information. Table below illustrates container traffic in Tema and Takoradi over the period 2002-2007 and the first three quarters of 2008.

Figures in Table below indicate that during the period 2001-2007 total container traffic for both ports grew by 144.5 per cent. If the 2008 data for the first 9 months are extrapolated to the full year, this increase would be even more pronounced: some 170.4 per cent, but this appears somewhat excessive. The previous increase (2007/2006) was 13.6 per cent overall; 15.0 per cent and 2.3 per cent for Tema and Takoradi respectively.

Overall, container traffic grew more rapidly for Tema than for Takoradi. For the whole period it increased by almost 130 per cent for Tema which handles (2007 figures) over 90 per cent of the total port container throughput in Ghana. Takoradi's container traffic grew only marginally in 2007 (2.3 per cent), compared to 13.6 per cent increase for Tema.

Table 14 : Container traffic in Tema and Takoradi 2001-2008*(TEU)

Year	Total	Tema	Takoradi
2001	221,468.00	178,342.00	43,126.00
2002	270,878.00	223,377.00	47,501.00
2003	346,981.00	305,868.00	41,113.00
2004	385,902.00	342,882.00	43,020.00
2005	442,082.00	392,761.00	49,321.00
2006	476,451.00	425,409.00	51,042.00
2007	541,373.00	489,147.00	52,226.00
2008	598,848.00	546,232.00	52,616.00

* First 9 months only. In (...) are extrapolated figures for the whole year 2008.

Source: Ghana Port and Harbour Authority (GHPA)

There are no, as yet, confirmed signs of the worldwide recession affecting port container throughput in Ghana, although some evidence may indicate a slowdown. The reason for that may be twofold: firstly, port statistics for the previous quarter are not yet available and, secondly, recession usually hits the developing countries with some delay compared to the industrialized world. Additionally, commercial and freight contracts may run well into the reporting period of the year under consideration.

The table below indicates the dynamics of port container throughput for the period under examination.

Table 15 : Evolution of port container throughput in Tema and Takoradi (TEU, 2001=100)

Year	Total	Tema	Takoradi
2001	100.00	100.00	100.00
2002	122.30	125.30	110.10
2003	156.70	171.50	95.30
2004	172.20	192.30	99.70
2005	199.60	220.20	114.40
2006	215.10	238.50	118.40
2007	244.40	274.30	121.10
2008	270.40	306.30	122.00

* Extrapolated on the basis of the first 9 months of 2008

There are striking differences in container throughput development trends in Tema and Takoradi. Whilst the total traffic grew by 144.50 per cent globally (170.40 per cent if the extrapolated figures are considered) that of Tema increased by a whopping 174.30 per cent (206.30 per cent with extrapolated figures). For Takoradi, the corresponding figures were 21.10 and 22.00 per cent, respectively.

Tema is Ghana's principal container port while containerization in Takoradi plays only a limited role.

Tema is properly equipped to handle the container traffic so far, but there are undeniable signs that even Tema is approaching its saturation point, particularly, although not exclusively, from the infrastructure point of view. The current depth at container berth of 11.50 m does not allow receiving ships larger than 3,500TEUs capacity and there is a genuine concern that the most efficient container lines such as Maersk, for instance, may drop service at the Ghanaian ports altogether. There is a strong pressure from the shipping end to concentrate container traffic at a small number of hubs in the region and Ghana may experience real difficulty to meet the hub challenge.

If the present rate of increase of container traffic in Ghana's ports is maintained (some 12-15 per cent increase annually) this traffic may double within the next 5-7 years. Are the Ghanaian ports ready to meet this challenge?

3. Directional structure of Ghana's container trades

There exists a directional imbalance of container movements in Ghana. Table below characterizes container port throughput broken down according to exports and imports.

Table 16 : Port container movements: exports and imports 2003-2008* (TEU)

Year	Total		Tema		Takoradi	
	Export	Imports	Export	Imports	Export	Imports
2003	163,79	183,191	138,967	166,901	24,823	16,29
2004	187,753	198,149	159,975	182,907	27,778	15,242
2005	211,748	230,334	181,492	211,269	30,256	19,065
2006	220,841	255,61	190,939	234,47	29,902	21,14
2007	260,502	280,871	231,459	257,688	29,043	23,183
2008	291,326	299,522	260,456	285,776	30,87	21,745 *

* Extrapolated from the first nine months of 2008

Source: ITPG Study Team's computations from GPHA_statistics

On average, for both ports, some 48 per cent of port container throughput are exports and 52 per cent imports. The imbalances are those containers which had not returned to ports or went to other ports than Tema or Takoradi after being shipped overland to the land-locked countries.

The proportion between imported and exported containers is not the same in Tema and Takoradi. In Tema only some 46 per cent of container throughputs are exports while 54 per cent are imports. There is even a higher portion of unreturned boxes than the average for both

ports. It is estimated that empties can represent up to 40 per cent of exported containers in Tema's port throughput.

The situation looks quite differently in Takoradi where the average figure for the 2003-2008 period was 60 per cent exports and 40 per cent imports. This is due to a use of return boxes for shipping from Takoradi of bagged cocoa beans and wood products, such as plywood and veneer and also some furniture parts. There does not seem to be any export movements of industrial semi-processed goods.

Table below includes percentage shares of export and import movements of containers through Tema and Takoradi in the years 2003-2008.

Table 17 : Percentage share of exported and imported containers in Tema and Takoradi: 2003-2008*

Year	Total		Tema		Takoradi	
	Export	Imports	Export	Imports	Export	Imports
2003	47.2	52.8	45.4	54.6	60.4	39.6
2004	48.7	51.3	46.7	53.3	64.6	35.4
2005	47.9	52.1	46.2	53.8	61.3	38.7
2006	46.4	53.6	44.9	55.1	58.6	41.4
2007	48.1	51.9	47.3	52.7	55.6	44.4
2008	48.6	51.4	47.7	52.3	58.7	41.3

*Extrapolated from the first nine months of 2008

4. Commodity structure of port container movements in Ghana

As mentioned earlier the main reason for the directional imbalance in the port container movements is the lack of return cargo. That, in turn, is the result of the very structure of Ghana's foreign trade in which the export side is chiefly composed of raw materials, while imports are predominantly industrial consumer and capital goods. Even if the imported volumes of liquid cargoes (crude oil and petroleum products) and components for cement production (clinker) are factored in, still the import side remains dominated by industrial goods.

Industrial and capital goods are usually termed as "general cargo" in ocean transportation. General cargo is fit for containerisation in the proportion of 80-90 per cent. But in Ghana this proportion is much less.

Tables below illustrate major commodity groups in the port throughput in Tema and Takoradi 2003-2007 ('000 tonnes).

Table 18 : Commodity structure of port throughput 2003-2007: Export ('000 mt)

Commodity Group	2003			2005			2006			2007		
	Total	Tema	Takoradi									
Liquid Bulk	215.7	215.7	-	385.4	385.4	-	152.4	152.4	-	154.8	154.8	-
Dry Bulk	2,171.7	52.2	2,119.4	2,729.6	51.5	2,678.1	2,856.8	43.8	2,813.0	2,255.7	79.0	2,176.7
General Cargo	46.8	45.8	1.0	109.7	108.4	1.3	147.1	143.1	4.0	61.5	60.0	1.5
Bagged Cargo	77.0	42.1	35.0	67.8	40.4	27.4	159.7	95.1	64.6	50.7	28.3	22.4
Containerized Cargo	730.4	480.3	250.1	1,028.7	704.3	324.4	1,022.4	703.4	319.0	1,144.1	842.9	301.2
Forest Products	56.9	1.5	55.4	40.1	0.4	39.7	41.8	0.5	41.3	40.1	0.1	40.0

Source: GPHA

Table 19 : Commodity structure of port throughput 2003-2007: Imports ('000mt)

Commodity Group	2003			2005			2006			2007		
	Total	Tema	Takoradi									
Forest Products	1.0	-	1.0	1.3	0.8	0.5	14.8	0.6	14.2	3.6	1.4	2.2
Liquid Bulk	2,106.2	1,963.4	142.8	2,591.1	2,417.2	173.9	2,676.7	2,500.3	176.4	1,273.4	1,018.4	255.0
Dry Bulk	2,049.5	1,139.9	909.6	1,985.9	1,052.1	933.8	2,086.1	1,185.5	900.6	2,144.3	1,208.1	936.2
General Cargo	363.6	323.7	39.9	783.3	737.0	46.3	588.0	555.5	32.5	695.5	652.2	43.3
Bagged Cargo	1,316.1	1,129.6	186.5	1,397.3	1,069.8	327.5	1,069.6	801.3	268.3	1,132.1	950.1	182.0
Containerized Cargo	2,081.7	1,997.2	84.5	2,765.5	2,682.7	82.8	3,154.8	3,069.0	85.8	3,476.6	3,383.3	93.3

Source:GPHA

The commodity structure of the port throughput in exports reveals several interesting points:

- Dry bulk, which principally includes minerals shipped from Takoradi, represents the main commodity group. It accounts for 61 per cent of the total outward shipments from both ports.
- In Takoradi this cargo group accounted for 85.6 per cent in 2007.
- Containerised cargo accounted for 31 per cent, but Tema throughput was almost 3 times larger than Takoradi's.
- General and bagged cargo, potentially fit for containerisation, accounted for a mere 3 per cent of the throughput.

For the imports the cargo group structure was different:

- Containerised cargo represented 39.8 per cent of the port throughput. The bulk of that (97.3 per cent) transited through Tema.
- Liquid bulk (80 per cent of that in Tema) represented in 2007 24.6 per cent of inward cargo for both ports. This is principally crude oil delivered to the Tema refinery.

The 155,000 tonnes of liquid bulk "exported" from Tema is constituted by petroleum products (petrol, kerosene, diesel oil, etc) shipped by coastal tankers to Takoradi. Container exports from Tema are almost exclusively composed of bagged cocoa and sawn wood. Bagged cargo exported from Tema and Takoradi represent a very negligible percentage of the port throughput, but in imports it constitutes a significant portion of the volumes handled: 13.2 per cent and 12.0 per cent of imports through Tema and Takoradi, respectively.

Bagged cargo, potentially fit for containerisation³¹, is composed mostly of wheat, ground for flour at both ports, rice, sugar, maize and other staples.

There remains the issue of general cargo³² which represented 8.0 per cent of a combined port inbound throughput but only 1.7 per cent of outbound volumes handled at both ports. These figures imply that practically the whole volume of general cargo at Tema and Takoradi is containerised. The percentage shares above are probably constituted by cargoes unfit for containerisation such as large pieces of industrial equipment.

5. Economic aspects of container cargo flows in Ghana

Rates charged for sea haulage of containers to and from Ghana are considered prohibitive. Indeed the rates charged by the EWATA conference members (Europe West Africa Trade Agreement), which controls the bulk of Europe to West Africa trades, are high compared to longer distances. A typical 20' conventional container fetched Euro 2,405 in the southbound direction from Europe to Tema and Euro 2,530 to Takoradi. A refrigerated container would

³¹ Whether a given cargo is containerised or not depends mostly on its value. Cargoes such as wheat, corn, rice etc. are containerised while cement is less so.

³² General cargo includes a practically unlimited variety of merchandise: a locomotive is general cargo, but so is the parcel including medicine or needles.

claim a freight rate of Euro 3,905 to Tema and Euro 4,030 to Takoradi. Both cases refer to a FCL (Full container load).

In the northbound direction: West Africa to Europe, a conventional 20' container costs between Euro 750 to Euro 1,198, depending on its contents. The more valuable the cargo, the higher the freight rate. Interestingly, the same rate is applied to both Tema and Takoradi.

A 20'refrigerated container fetches Euro 2,848 from Tema/Takoradi to Europe. As a reference, a 20' container from North American ports to Europe (a similar distance) will cost half the above rates, or less, if the numerous rebates applied by shipping lines are considered.

In liner shipping, which is dominated by shipping conferences, the freight charges are set not so much in relation to particular ports as for the so called ranges, that is to say several ports lying in the vicinity to one another, such as the ports of Northern Europe between Le Havre to Lubeck or even the Baltic ports. Sometimes extra charges called "range addition" are added if a particular port is not located within the "range".

The fact that different rate are applied to Tema and Takoradi southbound is warranted not so much by the "range" aspect as by port conditions. Dedicated container ships do not berth at Takoradi as the port is not equipped with container cranes like Tema. Container handling operations are carried out at Takoradi with ship's own gear, which explains the difference in freight rates.

It is interesting to compare freight rates charged to containers and to break-bulk cargoes. The latter are charged around Euro 130 per tonne in the southbound direction (both for Tema and Takoradi), and Euro 70 and 52.5 per tonne for outbound cargoes for Tema and Takoradi, respectively.

Assuming that a 20' container's payload is 18 tonnes, the freight rate for 1 tonne of containerised cargo would be Euro 133.6 for Tema and Euro 140.6 for Takoradi. In the case of the refrigerated container the corresponding rate are Euro 217 and Euro 223.9. But the actual payloads are smaller (see figures in Table below). In Tema the average payload was only 13 tonnes in inbound trades. The freight charges would be thus Euro 185/tonne, viz. 43.4 per cent above the conventional cargo. For Takoradi this ratio will be even higher.

The question therefore arises: does containerisation in Ghana's maritime traffic offer any significant savings as it does in other countries?

The answer to this question is not straightforward. The average rates indicate that there is little, if any, savings from the use of containers and that the latter were rather imposed on Ghana's shippers by their trading partners overseas. Indeed, many exporters and importers in the industrialized countries would ship their merchandise exclusively in a containerised form.

There remains, however, another troubling question: why are the freight rates to/from Sub-Saharan ports (including Ghana) so high?

To answer that question one has to go to full economic considerations. First and foremost , the trades to/from that region are not directionally balanced (see the previous section of this chapter). The shipping lines have to charge the rate that will cover its round-trip cost,that is including the return haulage of an empty container. Had the traffic been balanced that would not have to be the case. Rates charged for both directions would be more balanced.

The problem with containers is that the empty boxes in the outbound direction from Ghana are the non-paying cargo because they do not contain any goods. This is a problem not only in

Ghana but a worldwide phenomenon. But in other areas there are more chances to balance the cargo flows, no matter how imperfectly. In Ghana it is much less likely to happen.

The shipping lines are eager to secure return cargo for their containers. Had Ghanaian exporters had more goods to ship in containers, the freight rates for containers would have to go down. Unfortunately, there are few prospects for that. Table below illustrates payload of inbound and outbound containers in Tema and Takoradi.

Table 20 : Average payload in containerised cargo throughput: Tema and Takoradi (tonnes per TEU)

Year	Tema		Takoradi	
	Exports	Imports	Exports	Imports
2003	3.4	12.0	10.1	5.2
2004	4.1	14.3	11.0	5.1
2005	3.9	12.7	10.7	4.3
2006	3.7	13.1	10.7	4.1
2007	3.6	13.1	10.4	3.0
Avg	3.7	13.0	10.6	4.3

Source: Computed from data provided by GPH

Some explanations are necessary. Low figures for exports from Tema are due the fact that the averages have been calculated taking into account the total number of return containers. Only a small percentage of them are filled with export goods (cocoa and sawn timber). No data on payloads of such outbound containers were available; thus the average was low because it took into account the total number of containers moved outbound.

For Takoradi the situation is totally reversed; export containers are loaded on average with 10.6 tonnes per TEU. But imported containers are much less so which is probably due to the fact that some imported containers are brought to Takoradi empty to be loaded with exported goods: cocoa, plywood, veneer.

But the above considerations explain only partially the problem of high freight rates in the West African trades. Other factors also play a role. One of them relates to port conditions. Tema and Takoradi are congested. Ships that have to wait days to berth have a tendency to avoid such ports. But liner ships cannot because their schedules include these ports. The only way to cover ships' fixed costs is to increase freight charges.

Limited size of cargo lots is another explanation. It is always more economical to load/unload more containers in fewer ports than the other way round. By international standards Ghanaian container trades are very limited. The TEU per inhabitant of Ghana indicator is one of the lowest in the world. No economies of scale can be obtained in such conditions and Ghanaian shippers will have to do with high transport prices for the years to come.

Ship's turn-round time, which has a direct impact upon port costs, is a result of port productivity. This productivity is measured with the number of tonnes/TEUs per gang /per hour. Before dedicated container cranes were introduced in Tema, this productivity was very low: around 6 TEUs /gang/hour which gave around 290 TEUs per day. Specialized container cranes increased this to 1,100-1,200 TEUs per day with two cranes operating.

This dramatic increase of port productivity has not been reflected in lowering of the freight rates. Other factors came into play and one of them is congestion on the wharf due to administrative procedures involved with customs clearance of the containers. Generally speaking there will be no rate reductions until the entire port turn-round time is improved to such an extent that ships will spend less time in port. To do so, dramatic improvements in administrative procedures are necessary.

But there are other important issues, too. The main is the evacuation of containers from the port premises. The current conditions on roads in and around Tema, and Takoradi for that matter, do not offer this prospect. These roads are heavily congested.

Port congestion can be broadly divided as the ship-related congestion, i.e. the one that is caused by insufficient berth capacity, and off-ship congestion, that is the one that is caused by other factors than the ones strictly related to ships' arrivals and servicing at berth. It is strictly related to maritime trade. The former will increase as trade flows increase. Conversely, it will decrease as cargo flows diminish. But the off-ship congestion will not follow that trend. It will remain even at reduced cargo flows in and out of the port.

As mentioned before, cumbersome port procedures and the lack of through traffic arrangements in both ports are the main barrier to further expansion of containerisation in Ghana's maritime trades. This lack of through traffic is due to both technical and regulatory/institutional reasons. But one cause stands prominently in the way of through container flows: the slow progress of completion of the dry port at Boankra.

The main reason for delay is the lack of funding. It will cost as much as US\$ 600 million³³. But despite frenetic efforts by the former Government and numerous delegations of potential investors, no commitment has been secured.

But the completion of the dry port will not solve all the problems as long as there is no direct rail connection to the ports. In fact this connection has to reach the berth or a marshalling yard as near the container berth as possible. None is available now.

The lack of this facility causes many problems not only for Ghanaian shippers but also for those in the neighbouring land-locked countries who opted for the Ghana corridor for their container shipments. Frequent break-downs of trucks on the Accra-Kumasi highway not only cause delays but also serious accidents.

Ironically, port and road congestion related to container movements to/ from Ghanaian seaports may be soon somewhat alleviated due to the recession which is becoming obvious in Ghana. Frequency of ship sailings to Tema and Takoradi has fallen in recent weeks. Fewer containers in ports mean less cargo to be moved overland and this can contribute to a reduced congestion.

³³ Boankra can't find US\$ 600 million. "Graphic Business", February 24-March 2, 2009.

6. Conclusion

Containerisation in Ghana has made considerable inroads during the present decade. Traffic has grown fast and progress was made in servicing containerships in Tema where new, dedicated facilities were commissioned.

But a further expansion of this mode of transport is now facing serious obstacles. The most important ones relate to the “land side” of the transport chain, once the boxes have been discharged from dedicated container vessels. Heavy and timely investment in container infrastructure is indispensable in order to make door-to-door container service a reality in the Ghanaian transport industry.

Chapter 6 Liquid cargoes in Ghana's freight transport

Few statistics on liquid cargoes are available and it proved necessary for the Study Team to carry out some research to fill the gaps. Inevitably, time constraints made it difficult to produce a comprehensive data base for liquid cargoes in all modes of transport currently operating in Ghana.

1. Technical and organizational aspects of transportation of liquid cargoes

There are three major ways to carry liquid cargoes:

- By pipeline
- In dedicated vehicle (tankers)
- As a general cargo (drums, containers, etc).

All three types of transporting liquid cargoes are currently used in Ghana.

As far as particular modes of transport are concerned liquid cargoes are being transported in Ghana by the following modes:

- Rail
- Road
- Sea transport
- Inland water transport (Volta Lake)
- Pipelines

Generally speaking the totality of liquid cargoes transported in Ghana can be sub-divided as below:

- Crude petroleum and petroleum products, such as petrol, kerosene, diesel oil, aviation fuels, etc;
- Oil-palm
- Other comestible oils (e.g. coconut oil, vegetable oil, etc),
- Wine, vinegar and other comestible liquids
- Chemicals, such as liquid fertilizers, phosphoric acid and other acids.

It is often forgotten that one of the most common liquid cargoes transported in Ghana is...water. One has to look at the water tankers plying the street of the Ghana's metropolis to adequately appreciate the importance of this commodity.

Liquid cargoes transported in drums, barrels or other types of containers (e.g. LPG and LNG cylinders) should be excluded from this analysis as they no longer are liquid in terms of the transportation technology: they become a general cargo. The same is true about any other liquids in bottles (alcoholic and soft drinks, water, lubricants, etc), cartons (milk) or plastic bags (water sold at the city intersections).

All in all this leaves us with only those cargoes which are carried all along the transport chain in an unchanged and liquid form. In this respect there are only four different modes of carrying liquid cargoes in Ghana:

- Pipelines
- River barges on the Volta Lake
- Coastal tankers for petroleum products from the Tema refinery to Takoradi
- Road tankers

There are also deep sea tankers carrying crude oil and petroleum products to Tema refinery but these are foreign-owned and operated. What follows is a brief description of these modes.

1.1 Pipelines

A number of pipelines are in operation in Ghana.

Crude oil is transported to Tema by ocean tankers and unloaded at a single offshore facility at Kpone, managed by the Tema Offshore Limited. It is then pumped to the Tema refinery through a direct pipeline.

BOST currently operates two short pipelines. Petroleum products from the Tema refinery are pumped via pipelines to two depots: one at Mami and another one at Akosombo. A pipeline also feeds Accra Plains where the majority of fuel is 'lifted' by the oil marketing companies for distribution throughout Ghana. BOST have previously utilised the Tema to Akosombo pipeline with fuel barges from Akosombo to Buipe for distributing products to the north of Ghana. A new pipeline has also been constructed for BOST from Buipe to Bolgatanga although it is yet to be commissioned. However, in recent months BOST has ceased to use the VLTC fuel barges and therefore, not only is the pipeline from Tema to Akosombo currently not in use but this means that all fuel products are distributed by road. It is understood that BOST is aiming to establish an alternative fuel barge service on Lake Volta, extend the northern pipeline to Debreh to allow all year round operations and install another pipeline from Tema to Akosombo.

There is also a gas pipeline from Nigeria via Cotonou, Lome, Tema to Takoradi. It is not yet operational due to various problems in Nigeria. It has a total length of 678 km and a potential capacity of 600 million cubic feet a day.

1.2 Transport of petroleum products on Volta Lake

From the Akosombo transit depot petroleum products are carried to Buipe by barge. Two barges of 750 cubic metres capacity are operated, possessing a theoretical carrying capacity of 72,000 cubic metres a year. These barges are unloaded at Buipe and the products are then pumped to Bolgatanga via a 275-km long pipeline, from where oil products for the landlocked countries: Burkina Faso, Mali and Niger are picked up by road tankers. Transport on the Volta Lake is subject to variations in water levels and falls short of meeting the total demand for petroleum products and other cargoes³⁴.

1.3 Coastal shipping

Around 150,000 tonnes of petroleum products are shipped from Tema Refinery to Takoradi in small coastal tankers. The ITPG Study Team has not been able to obtain details concerning the ships used, their average size or steaming schedules.

1.4 Road Tanker Vehicles

Road transport of petroleum products (no crude oil is transported by road) is by far the main mode for transporting these cargoes. Bearing in mind that the future demand for petroleum products can triple or even quadruple by the end of the forecasting period, and the fact that other modes of transport for liquid cargoes (rail and inland water shipping) may not catch up with this increased demand, more strain will be put on the road transportation of liquid cargoes. That situation will be potentially harmful for the already overstretched road network in Ghana. There is an urgent need to develop alternative modes to transport liquid petroleum products in Ghana within the next 5-10 years. Road transport of petroleum products is handled by private operators (Oil Marketing Companies)³⁵.

2. Commodity generation in the area of liquid cargoes

2.1 Petroleum

Demand for transport generated by crude oil and petroleum products will be determined by the emerging oil industry in Ghana following the discovery of commercially viable crude oil deposits in Ghana's EEZ.

While it is yet unclear how this new wealth will be managed in Ghana, there is little doubt that the oil industry will create new demand for transport services. What follows is a concise recapitulation of the expected output of crude oil extraction in Ghana 2010-2035 (see table below).

³⁴ For details on traffic on Volta Lake see the ITPG Study Team's "Inception Report" and "Diagnosis Report" issued respectively in April and October 2009.

³⁵ For pricing and other economic factors relating to the road transport of petroleum products see: Strategic National Energy Plan 2006-2020. Annex III. Energy Commission, Ghana. July, 2006, p.4, and subsequent.

The initial output of crude oil from the offshore installations is expected to reach 120,000 b/d when the production begins in 2010. It is then expected to grow to 200,000 b/d. Ghana's daily needs in crude oil are estimated at 66,000 b/d, so even the initial production would suffice to cover the total needs of the country. It is not certain when the maximum output will be attained³⁶, or how long the reserves will last³⁷ but Ghana runs good chances to become a net exporter of crude oil, and possibly petroleum products, if an adequate refining capacity is made available. New discoveries are made and the initial period of full production estimated at 20 years may eventually be extended. Despite these diverging figures the production will by far exceed domestic needs.

Table 21 : Forecast output of Ghana's crude oil sector 2010-2035

Year	Daily production	Annual production
	(barrels)	(1000 barrels)
2010	120,000	43,800
2011	120,000	43,800
2012	120,000	43,800
2013	120,000	43,800
2014	120,000	43,800
2015	120,000	43,800
2016	120,000	43,800
2017	200,000	73,000
2018	200,000	73,000
2019	200,000	73,000
2020	200,000	73,000
2021	200,000	73,000
2022	200,000	73,000
2023	200,000	73,000
2024	200,000	73,000
2025	200,000	73,000
2026	210,000	76,650
2027	210,000	76,650
2028	210,000	76,650
2029	210,000	76,650
2030	210,000	76,650
2031	220,000	80,300
2032	220,000	80,300
2033	220,000	80,300
2034	220,000	80,300
2035	220,000	80,300

Source: ITPG Study Team's projections based on estimates of oil extraction from the offshore fields

³⁶ NDPC in their plan (see: Medium-Long Term ...op.cit; p. 45) forecast the total output of 200,000 b/d to be attained in 2016/2017. On the other hand, R.Darko Osei and George Domfe: Oil Production in Ghana: Implications for Economic Development (ARI), September 2008, p.4 quote the output of 250,000 b/d in 2012. This level of production seems rather unrealistic within this framework.

³⁷ R.Darko Osei and G. Domfe: op.cit; p. 4 estimate the total reserves at 2 billion barrels.

Assumptions:

- Initial production starts in 2010 and attains 120,000 b/d;
- Production reaches the target of 200,000 b/d in 2017
- In 2025/2026 the output grows to 210,000 b/d
- In 2031 output increases to 220,000 b/d
- 365 days in operation

It is quite feasible that both the volume of output and target dates will be different from the ones presented above, and that new discoveries will make it possible to substantially increase production above the targeted limits. But one thing will not change, viz. the impact of the oil industry on Ghana's transport system.

Three possible scenarios of this impact emerge:

- Total output is exported directly from the offshore rigs (**Scenario A**);
- Part of the output is exported and the balance is processed domestically (**Scenario B**)
- Ghana processes domestically the totality of the volume extracted (**Scenario C**).

There may also be variations of the above scenarios. Also the proportions between the volumes exported and processed domestically may change over time. But the impact on the demand for transport will be different under each scenario. What follows is a brief discussion of this impact³⁸.

Scenario A: Ghana exports the totality of its oil

Under this scenario the country will surrender all its offshore transport activity to international consortium of oil companies that will assure extraction and transport of crude oil. According to variants in table above, the total shipments of crude will amount to:

120,000 barrels X 365 days: 6.6 b/mt³⁹ = 6,636.4 thousand tonnes of crude oil to be shipped on an annual basis.

Assuming one weekly sailing of a parcel tanker of 30,000 dwt that will require a fleet of 4.25 ships :

6,636,363 mt: 1,560,000 tonnes of annual carrying capacity of a 30,000 dwt parcel tanker= 4.25 ships

By doubling the capacity of the ship (a non- feasible option), or increasing the frequency of sailings to two a week, the total number of vessels needed could be brought down to two.

³⁸ The main focus here is on freight transport. In terms of passenger transport the impact of the oil industry will mainly concern the movements of oil rig and refinery workers and the

³⁹ This is calculated on the basis of the volume/weight ratio. One barrel amount to 169 litres but oil weights less than 1 kg/litre (density of crude oil is between 1.1 to 1.25 litre/kg).

Increased production to 200,000 b/d would raise the tonnage requirements by two thirds and the shipping arrangements will have to be modified accordingly. The factors which will play the main role here would be: distance to refinery (ies), marketing options (how would the crude be marketed), and, of course, the size of the ships involved in this type of transport. It should be borne in mind that technical constraints, such as depth, size of the floating reservoirs for extracted oil, and the like, will determine the size of parcel tankers used for this type of transport. Last but not least sometimes tanker vessels are used as storage facilities in the offshore oil extraction but that depends on the gale force of the surrounding seas.⁴⁰ The oil companies have strict rules regarding the use of tanker vessels as floating oil depots.

Therefore, with all crude products exported, the main impact of Scenario A will be offshore affecting only the Maritime sub sector.

Scenario B: Ghana exports half of its crude oil and refiners another half

Under this scenario the impact of the oil production upon the country's transport system will be different. Half of the initial production, viz. 60,000 b/d, or 3,318.2 thousand tonnes of crude oil annually will have to be moved to either Tema refinery or a new refinery yet to be constructed. Using the same criteria as before, the tonnage requirements would be:

3,318,182 tonnes of crude oil: 1,560,000 tonnes of carrying capacity of a 30,000wt parcel tanker= 2.13 ships

Similarly to the previous scenario, the number of tankers to be operated will be proportionate to their size and the number of sailings per year. The larger the ships, and the higher the number of sailings, the lower the number of vessels will be required. Likewise, all the other considerations relating to storage of extracted oil, distance to the refineries, etc. will apply to this scenario.

As with Scenario A, if all processed products are immediately exported then Scenario B will impact on the Maritime sub-sector.

Scenario C: Ghana refines the whole production from offshore rigs

This scenario has identical parameters as in Scenario A, but in a reverse order, i.e. Ghana will assure the totality of transport services for the extracted crude oil to be shipped to the refineries. The calculation of the number of ships needed will be as follows:

6,636,363 mt: 1,560,000 tonnes of annual carrying capacity of a 30,000 dwt parcel tanker = 4.25 ships

Again, the factors relating to the total annual carrying capacity being a product of the ship's size and the number of rotations (sailings) she performs annually apply.

Under the Scenarios B and C Ghana will have to assure transportation of crude oil from the offshore rigs to the onshore refineries, current plans suggest this will be by pipeline or tanker. The location of these refineries and their processing capacity will have a direct impact upon

⁴⁰ Moored oil tankers as storage facilities are very fragile and can easily list in heavy seas causing oil spills.

demand for land-side transport of crude oil and petroleum products. At the time of writing this report, details were not available on production strategies.

However, the distribution of fuel products throughout Ghana will have an impact on land-side transport for which rail and road options must be carefully considered where possible.

3. Other liquid cargoes transported in Ghana

No other commodity from the review at the beginning of this chapter is transported in bulk form in substantial volumes. Oil palm, however, is of some interest as the produce is transportable in bulk form, particularly in these areas where oil palm is harvested for bio fuels (Malaysia, Thailand, Indonesia). While no statistics are available to substantiate that claim, palm oil is potentially transportable in liquid bulk form.

Oil palm production in Ghana is rather stagnating, after in 2001 (see data in table below).

Table 22 : Production of oil palm in Ghana in the years 1997-2007 ('000 metric tonnes)

Years	Thousand metric tonnes	2000=100
1997	955.5	89.6
1998	1,022.0	95.83
1999	1,031.9	96.76
2000	1,066.4	100
2001	1,586.5	148.77
2002	1,612.7	151.22
2003	1,640.1	153.79
2004	1,686.8	158.17
2005	1,712.6	160.59
2006	1,737.9	162.96
2007	1,684.5	157.95

Source: MoFA

In 2007 production of oil palm was 58 per cent higher than in 2000. It declined, however, by 3.1 per cent over its level in 2006.

Processing and transportation of oil palm in Ghana is rudimentary. Hardly any oil is stored in dedicated tanks and carried in liquid bulk form. In other areas, and not only in the major oil palm producing countries, such as Malaysia, Indonesia or Thailand, dedicated equipment is used to carry kernels to a processing plant and for transport of crude palm oil to storage⁴¹. No such facilities exist at the moment in Ghana but bearing in mind the strategic importance of palm oil, not only as a comestible produce but also as a source of energy (bio fuels), such facilities may appear on the transportation scene in Ghana.

⁴¹ One of the well established palm oil producers: New Britain Palm Oil Limited of Papua New Guinea operates a network of sophisticated facilities to market its product. The company runs a fleet of semi-trailer tankers of a carrying capacity of 34,000 litres. It also operates a specialised wharf at port Kimbe with storage tankers for over 25,000 tonnes of crude palm oil and oil products.

4. Conclusion

Unlike dry cargoes, commodities transported in liquid bulk form present quite different requirements from the industry's point of view. First and foremost, they require dedicated means of transport and handling facilities. On the operational front, movements of liquid cargoes are strongly directionally unbalanced, which creates economic constraints compared, for instance, with dry general cargoes, as a rule more directionally balanced. The more specialized the vehicles, the higher the proportion of empty return hauls⁴². Under such circumstances, economic constraints require high density cargo flows to attain efficiency. Owners of such specialized vehicles are either subsidiaries of the production-marketing concerns or are linked to them by long-term service contracts.

Liquid cargoes, and particularly crude oil and other petroleum products, may soon become an important commodity requiring transport throughout Ghana. Of the total of some 2.5 million tonnes of petroleum products currently carried in the country, this volume may double within the next decade.

⁴² Road tankers carrying inflammable or dangerous chemicals usually have a 50 per cent ratio of empty return hauls.

Chapter 7 Commodity generation by the agricultural sector in Ghana

1. Introduction

Among the sectors that generate demand for transport services agriculture plays a very special role. While minerals, timber or even cocoa industry create demand for transport that can be relatively easy to quantify, and forecast with a reasonable degree of accuracy, agriculture in its entirety is a different matter. For agriculture means transport at every conceivable level: carrying of fertilizers and seeds and plant protection agents, evacuation of crops from the fields, marketing of produce and its processing, shipping of produce to seaports (or airports to a lesser degree) and ocean transport to overseas destinations. Agriculture also means movement of people who grow, harvest and market the crops.

This part of the ITPG Study Team's commodity report is looking into some crucial aspects of the transport side of the agricultural sector in Ghana. It is purposefully limited to **freight transport**. It covers major produce, with the exception of cocoa which was dealt with separately. Both domestic and international transport issues are discussed, although scarcity of reliable data has shifted the paper's focus towards domestic trades.

2. Overview of the agricultural sector in Ghana

Agriculture is the principal field of economic activity in Ghana and will probably remain so in the years to come. In 2007 agriculture contributed 38 per cent to the country's GDP, a share hardly changed over the years. Directly and indirectly, close to 60 per cent of the population are employed or live off agricultural activities. Table 23 below shows some basic data on agriculture in Ghana.

Table 23 : Baseline statistics on agriculture in Ghana

Item	No	Rank*	Definitions
Agricultural Growth	152	8/149	Increase since 1989
Agricultural Land % of total	64.8	29/198	Percentage of Land Area
Agricultural Land sq km	147,350 sq. km	59/198	
Agric Machinery & Tractor	3,600	110/190	
Arable and Permanent cropland	5,809,000 ha	40/148	
Cereal Yield	1,457.60	124/171	Kgs per hectare
Cotton Production	70	37/109	000 bales
Cotton Exports	15	49/109	000 bales
Fertilizers use	2	127/138	Kgs per hectare
Labour Share	56.6	41/149	Percentage of Population
Meat Production	140000 m. tons	91/149	
Pesticide use	0 kg	43/45	
Tractor concentration	0.6	125/147	No. of Tractors per 1000 ha
Main Produce: Cocoa, Rice, Cassava, Maize, Shea Nuts, Yam, Bananas			
Annual Growth of Value Added %	4.14	49/164	

* Indicates the position of the country among the countries of the world for which statistics are available

Sources: Food and Agriculture Organization of the United Nations (FAO), World Development Indicators database, World Resources Institute; US Department of Agriculture. CIA World Fact-books.

A quick look at these statistics reveals several facts:

- Ghana's agriculture is characterised by a very low degree of mechanization (0.6 tractors per 1,000 hectares)
- Agricultural land use is fairly high (almost 65 per cent of the total land area) but the arable land represents only 18.4 per cent of the land area. That puts Ghana at the 60th position amongst 200 countries of the world.
- Almost 60 per cent of the entire population is directly or indirectly employed in this sector of the nation's economy.
- There is a very low use of fertilizers; only 2 kg per hectare.
- There is one positive factor: no use of pesticides.

Needless to say that figures in table above do not reveal all the factors that make Ghanaian agriculture and the most relevant one, viz. the fact that the country has not as yet attained the food security status. While there are surpluses of certain staples, such as tubers and rooters, others are in short supply. It is worthwhile mentioning that importation of rice consumes the amount of US\$ 500 million a year, 5 times more than during the past decade. In the past Ghana did not import significant quantities of this staple.

One of the reasons for that is the changing structure of the Ghanaian agriculture and the emphasis being shifted to cash crops, such as cocoa. But also the fact that virtually all agricultural production in Ghana is rainfall-based. Inadequate rainfall destroys crops or severely reduces yields.

Yields are generally low. In cereal production Ghana is 124th among 171 nations in the world, with 1,458 kg of grain per hectare. In palm oil the achievable yields are 20 per cent higher; 40 per cent for maize and rice and 60 per cent for cocoa.⁴³

There are many reasons for low agricultural productivity in Ghana: low degree of mechanization, low use of fertilizers, quasi total dependence on rainfall. But there are also structural reasons. Smallholder farms which account for 80 per cent⁴⁴ of the holdings cannot be equally productive as larger, highly mechanized farms specializing in limited number of crops. More than 70 per cent of Ghanaian farms are 3ha or less⁴⁵. The smallest average holdings are found in the south of the country, the larger ones in the north. Nevertheless, while the holding size increases from south to north this increase in size is not accompanied by a simultaneous increase in productivity⁴⁶. Compounded with the lack of non-agricultural employment opportunities in the northern regions, the overpopulated agriculture faces serious obstacles in its quest for increased productivity and profitability.

There are, however, other factors which threaten Ghana's agriculture and farmers' livelihood. One of them involves importation of subsidized food products from EU and other areas. Local producers, e.g. of poultry, are in no position to compete with imported subsidized frozen chicken. The welfare of 400,000 small poultry farmers in Ghana⁴⁷ is threatened.

International trade regulations, and in particular the failure of the Doha Round on tariffs on food and agricultural products, may seriously compromise the policy objectives for Ghana's agriculture. Opening of customs borders to heavily subsidized food imports into Ghana, and other Sub-Saharan countries for that matter may ruin small, uncompetitive local producers. This is true not only for the poultry producers. The removal of subsidies under the IMF structural adjustment program, according to critics of market liberalization, was responsible for a sharp fall in rice farming in Ghana whose rice consumption is covered in only 35 per cent by the domestic production.

But apart from low productivity and competition from subsidized imports, Ghana's agriculture faces probably the most formidable challenge of all viz. land availability. In the mid 1990s the land availability ratio, measured with the number of hectares per capita stood at 0.80. By 2020, i.e. roughly in a decade, it will decline to 0.38 ha/capita, that is by 52.5 per cent. The shrinking availability of agricultural land in Ghana is the result of two factors: firstly, the declining share of agricultural land due to construction of roads, residential developments,

⁴³ G. Nankani: Ghana: Challenge of Agriculture- What is to Be Done? "Ghana Business News", February 25, 2009.

⁴⁴ International Trade centre UNCTAD/WTO: country profile Ghana. Release April 1, 2009.

⁴⁵ See: J. Chamberlain: Defining smallholder agriculture in Ghana: Who are smallholders, what do they do and how are they linked with markets? GSSP Background Paper no.6. Washington D.C. 2007; after: Ghana Strategy Support Program-IFPRI. Discussion Brief 3. International Food Policy Research Institute; p. 2.

⁴⁶ Op.cit.

⁴⁷ More on this issue: Playing Chicken: Ghana vs. The IMF. "The Corp Watch". Release April 2, 2009.

mining⁴⁸, etc., and secondly the fast growing population. If the above trends persist, Ghanaian agriculture will have to double its productivity within the forthcoming decade, just to maintain the current level of food security, let alone its increased contribution to GDP.

Land availability, which is shrinking, alone will not guarantee an increased contribution of agriculture to poverty reduction and its transformation into “an engine of growth”, as called for in macroeconomic policy programmes. What really matters is not how much land is available but how this land is used for agricultural production. Some estimates suggest that, due to problems with ownership rights, as much as **80 per cent of arable land remains uncultivated**.⁴⁹ This is a very disturbing fact.

The above issues, although relevant, do not constitute the main purpose of this report. Its main focus is the commodity analysis and linkages to transportation activities. What follows is a succinct analysis of agricultural production in Ghana by major crops and commodities in the light of their impact on the country’s transport system.

3. Classification of agricultural output in Ghana

There are various classifications of agricultural sector in Ghana. One of them sub-divides agriculture into 5 sub-sectors⁵⁰:

- Non-cocoa sub-sector accounting for 63 per cent of agricultural GDP;
- Cocoa sub-sector (14 per cent)
- Livestock (5 per cent)
- Fisheries (7 per cent)
- Forestry (11 per cent)

The non-cocoa sub-sector include: cereals (maize, rice, sorghum and millet) and roots and tubers (cassava, yam and cocoyam). It also includes industrial crops, such as tobacco, cotton, kola nuts, oil palm, rubber, groundnuts, copra and sugar cane. Horticultural crops include pineapples, mangoes, chilli peppers, ginger, lime and oranges, as well as other crops such as plantain, banana, beans, tomatoes, onions, cucumbers, and the like.

The livestock sub-sector is composed of cattle, sheep, goats, pigs and poultry.

The fisheries sub-sector includes marine and fresh water fish, lobsters and shrimps and other species.

The forestry sub-sector (see section 3.1) includes a variety of timber and wood products.

Agro-industrial processing is not well developed although it is slowly growing. Overall some 90 per cent of agricultural output is consumed in a raw form. Some of agricultural produce is wasted due to inadequate storage and lack of affordable transportation. The post-harvest management of agricultural output is generally still lagging behind.

⁴⁸ According to Owusu Koranteng, the Executive Director of Wassa Association of Communities Affected by Mining (WACAM) the area of mining concession granted by the Government cover 30 per cent of the country’s land surface. See: Mining is Killing Agriculture-WACAM. “The Ghanaian Chronicle”. April 2009.

⁴⁹ G. Nankani: op.cit; p.5

⁵⁰ Classification provided by the former Chief Director of the Ministry of Food and Agriculture – Mr. Samuel K.Dapaah

4. Trends in agricultural output in Ghana 1998-2008

The present report is focusing on principal agricultural produce classified as below:

- **Industrial crops:** These include the following: cocoa, oil palm, coconut, coffee, cotton, kola and rubber.
- **Starchy staples:** cassava, cocoyam, yam, maize, rice, millet, sorghum, plantain.
- **Fruit and vegetables:** pineapple, citrus, banana, cashew, pawpaw, mangoes, tomatoes, egg plant, onion, Asian vegetables.

It should be noted that **cocoa**, due to its importance as an export commodity, has been treated in a separate part of this commodity report.

Table below indicates the total area planted to selected crops in the years 1998-2007. Overall the area for the eight selected crops has increased by 11.8 per cent during the period under review. Since 2002, however, this area has shrunk by 9 per cent. The biggest loss of acreage occurred for sorghum (124,000 ha or 37.3 per cent). Rice followed with a loss of 21,000 ha, or 16.2 per cent compared with the 1998 acreage. Millet, that was planted on 163,000 ha, has lost 10 per cent of the planted area compared to that in 1998.

Not surprisingly these three staples are amongst the five produce where shortages of supply exist. The combined volume of short supply of the five staples stood at 553,000 tonnes, of which rice was short by 246,000 tonnes. An earlier part of this report explains some reasons for these shortages.

Table 24 : Area planted to selected crops ('000 ha)

Crop	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>Maize</i>	697	697	695	713	940	792	733	740	793	790
<i>Millet</i>	181	186	208	193	198	207	182	185	200	163
<i>Rice</i>	130	105	115	135	123	118	119	120	125	109
<i>Sorghum</i>	332	312	289	329	337	346	298	305	320	208
<i>Cassava</i>	630	640	660	726	794	807	784	750	790	801
<i>Cocoyam</i>	218	372	247	262	282	277	270	255	260	258
<i>Plantain</i>	246	253	244	265	277	286	281	290	299	305
<i>Yam</i>	211	243	261	287	300	321	311	300	325	324
Total	2,645	2,808	2,719	2,910	3,251	3,154	2,978	2,945	3,112	2,958

Source: Ministry of Food and Agriculture; Research and Information Directorate (SRID)

The drop in area planted to some crops in table above has been compensated by increases in certain industrial crops, such as cocoa, seed cotton, oil palm, tomatoes and other vegetables, pineapple, coconut, banana, kola, rubber and tobacco. The total area for the above crops was 4,290,000 ha or 45 per cent more than crops in table 24. Cocoa alone represents a cultivated area of 2.2 million ha⁵¹.

Table 25 : Production of selected food crops ('000 Mt)

Crop	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Maize	1,015	1,015	1,013	938	1,400	1,289	1,158	1,171	1,189	1,220
Millet	162	160	169	134	159	176	144	185	165	113
Rice (paddy)	281	210	215	253	280	239	242	237	250	185
Rice (milled)	169	126	129	152	168	143	145	142	150	111
Sorghum	355	302	280	280	316	338	287	305	315	155
Cassava	7,172	7,845	8,107	8,966	9,731	10,239	9,739	9,567	9,638	10,218
Cocoyam	1,577	1,707	1,625	1,688	1,860	1,805	1,716	1,686	1,660	1,690
Plantain	1,913	2,046	1,932	2,074	2,279	2,329	2,381	2,792	2,900	3,234
Yam	2,703	3,249	3,363	3,547	3,900	3,813	3,892	3,923	4,288	4,376
Total	15,347	16,660	16,833	18,032	20,093	20,371	19,704	20,008	20,555	21,302

Source: SRID Note: Milled rice is estimated to be 60% of paddy.

Overall the output has increased by nearly 39 per cent within the period under review. However, the fastest growth occurred in the first half of that period (years 1998-2003), when a 32.7 per cent increase was recorded. After that the rate of increase of the output slowed down; it was only 6.5 per cent during the period 2000-2007. That slower increase has certainly contributed to the deficit in some staples that is also the result of the fast growing population of Ghana. Taking the average of 1996-1997 as 100, the evolution of the major crops was as follows (data for 2007):

■ Maize	122
■ Millet	67
■ Rice	90
■ Sorghum	45
■ Cassava	145
■ Cocoyam	110
■ Yam	187

⁵¹ Cash flow is the main incentive to convert subsistence farming holding into cash/industrial crops, such as cocoa, for which the farm-gate price may reach up to 70 per cent of the f.o.b. price, a very strong incentive for farmers. This trend will invariably lead to further decline of traditional farming.

Generally speaking, cereals recorded losses in output while tubers and roots showed increases. The rate of growth was, however, different for each produce. Cocoyam, for instance, stagnated and even regressed. From 2002, the year of record crops, it has actually shrunk by 11 per cent. Plantain is the only produce that has posted a consistent growth, and also yam, although with a less consistent growth trend.

Significant information is included in table below. It contains data on actual yields as compared to potential ones. It relates to crops grown under rain-fed conditions and implies that, should these conditions be more favourable, the yields could have been much higher, sometimes by as much as 3-4 times.

A comparison between two columns of table 26 indicates that there is a lot of room for yield improvement. More irrigation facilities, improved seeds, better fertilization and pest control could substantially increase yields, and consequently overall output by the sector. To do so, however, would require heavy investment and Ghana, on its own, is rather unable to secure it⁵².

That domestic finance is alarmingly inadequate for agriculture is nobody's secret. As can be concluded from figures in Table 27 further in the text, the total expenditure from the budget hardly increased over the past few years. In fact it has decreased compared to the year 2000. It then stood at 1.89 percent of the total expenditure, compared with 1.70 per cent in 2007.

⁵² Foreign Direct Investment (FDI) would certainly be an alternative. But FDI, which grew by an astounding 680 per cent in 2008, seems to avoid the agricultural sector, focusing rather on the mineral sector and services, mostly telecommunications. For more details see: The Corporate Guardian. The International Business Magazine. February 2009, p. 24.

Table 26 : Actual and potential yields in selected major crops produced in Ghana

Crop	Yield (Mt/Ha)- 2007	Achievable Yield (Mt/Ha)
Cassava	12.8	48.7
Plantain	10.6	20.0
Yam	13.5	49.0
Cocoyam	6.6	8.0
Maize	1.5	6.0
Rice (Paddy)	1.7	6.5
Cowpeas	0.9	2.6
Soybean	1.1	2.3
Groundnut	0.9	2.5
Millet	0.7	2.0
Sorghum	0.7	2.0
Sweet Potato	8.0	24.0
Taro	9.5	12.0
Cocoa	0.4	1.0
Coffee	1.5	-
Cashew	0.8	1.8
Orange	35.0	-
Pawpaw	45.0	75.0
Mango	11.0	-
Pineapple	50.0	72.0
Cotton	0.8	-
Rubber	0.8	-
Tobacco	1.6	-
Tomato	7.5	15.0
Garden eggs	8.0	15.0
Pepper	6.5	32.3

Source: MoFA

Table 27 : Share of MoFA in central government budget (Gh ¢ billion)

Expenditure Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total Central Gov't Expenditure	5,005	2,717.6	3,295.404	13,073.8	15,447.0	10,442.1	10,513.2	12,693.8	17,912.0	19,925.9
Total Expenditure on Agriculture	35.12	43.59	62.23	62.46	127.02	136.68	142.71	209.75	256.9	338.3
<i>Development Expenditure on Agriculture</i>	11.15	15.37	22.30	18.45	61.42	21.36	38.20	96.78	119.6	144.2
<i>Recurrent Expenditure on Agriculture</i>	23.97	28.22	35.52	44.01	65.60	115.33	104.51	112.97	137.3	194.1
Total Expenditure on Agriculture (%)	0.70	1.60	1.89	0.48	0.82	1.30	1.36	1.65	1.43	1.70

Sources:..Budget Division, MoFA, Accra. 2. Ghana Statistical Service, Accra.

There are obviously other sources of investment in agriculture, including local governments, foreign direct investments, grants and others. But on the whole, investment in this sector of the Ghanaian economy is by far inadequate. Self-financing by farmers is adversely affected by the system of credit with exorbitant interest rates⁵³.

What is particularly worrisome is the declining rate of increase in the share of agriculture in the central government's budget. The latter grew almost fourfold between 1998 and 2007. The share of agriculture in this budget grew only 2.4 times over the corresponding period of time, despite and apparent 9.6 times increase in absolute terms. That disproportion signifies that **financing of agriculture is not a budgetary priority**. If one remembers that the agricultural sector contributes almost 25 times more to the nation's GDP than its share in the budget, this is a very worrisome trend indeed.

The issue of financing the agricultural sector, although of paramount importance not only for this sector but for the whole economy of Ghana, is not however the main focus of the present report. It is in fact an issue of its own. It seemed, however, indispensable to mention it for the sake of a better understanding of the main obstacle to growth of agricultural output in Ghana.

The impact of agricultural output upon **demand for transport** comes through the relationship between the actual output of the sector and the domestic consumption. Surpluses are normally marketed and will require transport capacity. Conversely, shortages will have to be covered from imports if food security is to be maintained. But as can be seen further in this chapter, not all the surpluses are marketed in Ghana. The following two tables 28 and 29 show the consumption per capita of selected food crops and the relationship between the domestic food supply and demand.

Data in Table 28 cover a 25-year period 1980-2005. They indicate that per capita consumption of basic staples evolved in a somewhat peculiar way. Between 1980 and 2005 the per capita consumption of **cassava** increased only marginally: from 145.2 kg to 152.9 kg or by 5.3 per cent. That translates into an average annual increase of only 0.2 per cent. For **yam** there has actually been a decline of 5.2 per cent, while for **cocoyam** (1990-2005) the increase in per capita consumption was 5.7 per cent.

⁵³ According to the "Graphic Business" of April 7, 2009, commercial banks, in reaction to recent increase of the prime rate by the Bank of Ghana, have readjusted their base lending rate which is now averaging 30 per cent. Some banks, who fear an increase in the number of default cases, charge now up to 35 per cent interest rate on loans.

Table 28 : Per capita consumption of selected crops in Ghana in the years 1980-2005

Commodity	Kg/head/year*					
	1980	1985	1990	1995	2000	2005
1. <u>Roots & Tubers</u>						
Cassava	145.2	146.3	148.0	149.7	151.4	152.9
Yam	44.2	43.8	43.3	42.8	42.3	41.9
Cocoyam	-	-	54.0	55.0	56.0	57.1
Plantain	82.2	82.5	83.0	83.5	84.0	84.8
2. <u>Cereals</u>						
Maize	38.4	39.2	40.3	41.4	42.5	43.8
Rice (milled)	12.4	12.7	13.3	13.9	14.5	15.1
Millet	8.5	9.4	5.1	12.6	9.0	6.4
Sorghum	13.0	14.4	9.3	21.7	14.8	10.1
Wheat	-	-	-	-	8.0	8.0
3. <u>Fish</u>	-	-	23.6	24.2	27.0	30.2
4. <u>Meat</u>	-	-	8.0	6.3	6.7	7.1

*In the absence of a household consumption survey, these estimates have been based on food available for human consumption from both domestic and import sources. For fish, imports amounting to 100,000 Mt were considered.

For meat, bush meat consumption of 40,000 Mt and import amounting to 20,000 Mt has been considered. Dashes indicate cells for which information was not available.

Source: MoFA

Throughout the whole 25-year period, the per capita consumption of **plantain** increased by only 3.2 per cent or by a meager 0.13 per cent on a year by year basis.

These small increases in the per capita consumption of traditional staples may suggest that in terms of nutritional standards there has been very limited progress and that the caloric intake for an average Ghanaian must have come from other staples⁵⁴.

In terms of **cereals**, which in a country like Ghana usually provide an important source of nutrients, there has been a decline in consumption. For **millet** the decline in the per capita consumption was 24.7 per cent and for **sorghum** this decline was 22.3 per cent⁵⁵. The decrease in per capita consumption of these staples has been compensated by a 21.8 per cent increase in the consumption of **rice**. Partial compensation has also come from the increased consumption of **maize**: a 14.0 per cent increase over the period. There has been no change in the per capita consumption of **wheat** in the years 2000-2005, despite an increased volume of imports⁵⁶.

⁵⁴ The consumption of inadequate amounts of nutrients leads to malnutrition, especially among children. The 2003 demographic and health survey found that over 80 per cent of children and 48 per cent of women in rural Ghana are anaemic. Ministry of Food and Agriculture.

⁵⁵ The per capita consumption of sorghum experienced a free fall after 1995, the year it was more than twice its 2005 level.

⁵⁶ Ghana does not grow wheat. The consumption of wheat flour is covered from imports.

Table 29 : Domestic food supply and demand position (2007)

Crop	Total Domestic Production (‘000 Mt)	Production Available for Human Consumption* (‘000Mt)	Per Capita Consumption (kg/Annum)	Estimated National Consumption (‘000Mt)	Deficit/ Surplus (‘000 Mt)
Maize	1,220	853	43.8	971	-118
Rice (Milled)**	111	89	15.1	335	-246
Millet	113	79	6.4	142	-63
Sorghum	155	109	10.1	224	-116
Cassava	10,218	7153	152.9	3391	3,761
Yam	4,376	3501	41.9	929	2,571
Plantain	3,234	2749	84.8	1881	868
Cocoyam	1,690	1352	57.1	1266	86
Groundnut	302	257	12	266	-9
Cowpea	119	101	5	111	-10
Total	21,537	16,242		9,517	6,724

Source: SRID

Notes: Estimated Population for 2007, based on 2000 census figure (18.9 m) and a growth rate of 2.7 % = 22.18 m. * 70% of Domestic production for maize, millet, sorghum and cassava; 80% for rice, yam, cocoyam; 85% for plantain, groundnuts and cowpea. Livestock feed, wastage and seed account for the discount. ** 60% of paddy rice which stood at 185,000 MT for 2007.

There has been a 11.3 per cent decline in the consumption per person of protein-rich **meats**. This decline seems to have been compensated by an increase in the consumption of fish (28 per cent)⁵⁷.

Table 29 recapitulates the ITPG Study Team’s earlier findings on the relationship between supply and demand for selected staples. Amongst 11 major crops covered, surpluses exist for cassava, yam, plantain and cocoyam. Deficits are noted for all the cereals plus groundnuts and cowpea. The combined deficit is 562,000 tons. The aggregate surplus stood at 7,724,000 metric tons, thus it outweighed the deficit by a factor of 13:1.

The last column in Table 29 shows the actual surplus (total output available for human consumption less estimated national consumption of major staples). The total domestic output (column 2 in Table 29) also includes wastage, animal feed and seeds for replanting. The estimated share of these three components in the total output is around 25 per cent.

The surpluses in four crops notwithstanding, the existing deficits cannot be readily substituted for from the surpluses as the former involve cereals. Imports are indispensable. Importation means *inter alia* demand for transport, both international (predominantly maritime transport) and domestic. It adds additional volume that needs to be carried.

The overall picture of agricultural production in Ghana would be incomplete without industrial crops and food imports. These are shown in tables 30 and 31 below.

⁵⁷ It is estimated that up to 60 per cent of protein needs of the Ghanaian population come from fish consumption.

Table 30 : Production of industrial crops in Ghana

Year	Cocoa ¹	Coffee ¹	Sheanut ¹	Seed Cotton ²	Tobacco ³	Oil Palm ⁴
1997	322,490	2,880	21,504	24,953	2,020	955,505
1998	409,360	8,370	34,886	33,803	2,390	1,022,010
1999	397,675	3,965	17,465	38,127	2,556	1,031,919
2000	436,634	1,956	30,771	35,503	2,457	1,066,426
2001	389,591	1,379	19,882	17,506	1,233	1,586,500
2002	340,562	1,464	27,160	22,851	2,155	1,612,700
2003	496,846	338*	n.a.	16,822	2,150	1,640,100
2004	736,975	477*	n.a.	20,155	2,359	1,686,800
2005	599,318	270*	30,000	21,000	1,350	1,712,600
2006	740,458	164*	n.a.	n.a.	n.a.	1,737,900
2007	614,532	304*	n.a.	n.a.	n.a.	1,684,500

Sources: 1. COCOBOD, 2. Agricultural Development Bank. 3. British American Tobacco Co. 4. Oil Palm Companies (GOPDC, TOPP, BOPP, NOPL) and Individual Plantations.

*Values updated with more current and complete information.

Table 31 : Imports of cereals into Ghana (1999-2007)

Year	Wheat	Rice	Maize	Sorghum	
1999	Quantity (Mt)	181,645	241,610	201.21	-
	Value \$ million	102.7	95	0.07	-
2000	Quantity (Mt)	196,700	187,256	5,050	819
	Value \$ million	72.03	65.03	0.73	1.18
2001	Quantity (Mt)	168,816	311,513	10,589	4,040
	Value \$ million	64.25	72.46	1.52	2.75
2002	Quantity (Mt)	182,681	296,953	10,470	5,135
	Value \$ million	78.59	68.85	2.08	2.25
2003	Quantity (Mt)	147,779	797,705*	163	193
	Value \$ million	50.7	124.66	0.07	0.002
2004 ^a	Quantity (Mt)	247,991	253,905	140	2.6
	Value \$ million	84.32	119.15	0.086	0.77
2005 ^a	Quantity (Mt)	369,733	484,513	54,965	n.a.
	Value \$ million	99.69	138.94	12.31	n.a.
2006 ^a	Quantity (Mt)	254,052	389,660	6,572	0.58
	Value \$ million	46.37	159.47	1.43	n.a.
2007 ^a	Quantity (Mt)	332,299	442,073	596	n.a.
	Value \$ million	111.38	157.86	0.21	n.a.

Source: Ministry of Trade & Industry, Accra. ^a Figures from GSS.

* Part of this amount may have been trans-shipment to neighbouring countries. However, this could not be ascertained from the MOTI, PSI.

In 2005, the last year for which detailed statistics on all major industrial crops were available, the total output stood at 2.4 million tons. The percentage share of particular crops was as follows:

Table 32 : Percentage share of particular crops

Crops	Percentage
Oil Palm	72.4
Cocoa	25.3
Shea nut	1.3
Seed cotton	0.9
Coffee, Tobacco	0.01
Total	100 %

It is noteworthy that over the period 1997-2007 there have been considerable changes in the overall output of industrial crops; cocoa increased twofold over that period and oil palm increased by 72.5 per cent. There has, however, been a dramatic fall in coffee production: from 2,880 tons in 1997 to a mere 304 tons in 2007. The 2007 crop was 9.5 times less than in the peak year of 1997. Shea nut, seed cotton and tobacco accounted for only 1 per cent of industrial crops in Ghana.

Ghana is forced to import considerable quantities of food (see table 30 for details). Imports include both crops that can be grown locally, such as rice and maize, and those which are not grown in Ghana (wheat). In 2007 332.3 thousand tons of wheat, 442 thousand tons of rice and 600 tons of maize were imported into Ghana. In 2007 imports of rice increased by 13.3 per cent over 2006 and those of wheat even faster: 30 per cent. Added to these volumes is the tonnage of imports under the food aid programme (FAO). Volumes of some 50-60,000 tonnes fluctuate from one year to the other, depending on the urgency of food needs that prompts donors to grant food aid to Ghana.

Table 33 : Food aid imports into Ghana 2002-2008

Year	Wheat	Rice	Soya bean	Sorghum	Maize ^c
2002	44,570	2,010	1,580	9,920	n.a.
2003 ^a	47,360	667	670	3,500	698
2004 ^a	25,578	6,751	n.a.	3,497	638
2005	20,566	600	n.a.	8,059	1,702
2006	42,378	425	n.a.	8,541	2,165
2008 ^b	n.a.	n.a.	479	n.a.	6,607

Source: World Food Program

^a Revised with the inclusion of data for maize and rice. 2004 figures revised to actual amounts received.

Note: Food Aid imports of wheat and rice are accounted for in table above. n.a.: None of these commodities came into the country as Food Aid for that year. ^b Represents only values from January – July 2008. ^c Maize value includes Maize Meal (195Mt) and CSB (1,254Mt). Values for 2007 were not available at the time of publishing.

The overall picture in terms of agricultural commodities and inputs requires provision of statistics on imports of agricultural inputs: fertilizers and agro-chemical products (insecticides, fungicides, herbicides, etc). These are presented in tables below.

Table 34 : Fertilizer imports into Ghana 1997-2007 (mt)

Year	15-15-15 (NPK)	Other NPK	Urea	M. of Potash	SOA*	SSP & TSP*	Nitrate*	Pot. Sulphate	Cocoa Fert.	Others	Total
1997	19,230	17,850	1,850	5,450	10,700	0	n.a.	n.a.	n.a.	1,083	56,163
1998	13,058	8,800	500	3,095	13,265	500	n.a.	n.a.	n.a.	3,097	42,315
1999	3,202	400	n.a.	8,066	4,800	3,500	n.a.	n.a.	n.a.	2,025	21,993
2000	14,127	775	141	4,510	23,165	600	n.a.	n.a.	n.a.	180	43,498
2001	31,787	17,500	2,500	4,147	22,628	700	n.a.	n.a.	n.a.	1,586	80,848
2002	n.a.	800	n.a.	18,484	20,047	1,656	n.a.	n.a.	n.a.	901	41,888
2003	16,930	1,960	500	23,440	25,715	n.a.	7.35	n.a.	19,500	4,027	92,807
2004	17,118	1,105	250	822	7,688	1,850	95,312	72,000	25,000	2,588	223,733
2005	26,100	12,878	4,540	1,000	15,000	1,000	157	135	12,000	18,496	91,306
2006 ^a	84,907		9,072	19	19,090	99	52,601	103	n.a.	23,988	189,879
2007 ^a	87,388		4,962	109	17,458	504	52,823	321	n.a.	26,029	189,594

Source: 1. Ministry of Food and Agriculture, Crops Services Directorate, Accra 2. GSS, Accra (2004-2007).

*SSP & TSP are Single and Triple Super Phosphate respectively. SOA is Sulphate of Ammonia. Nitrate fertilizer includes Potassium and Calcium Nitrate. ^a NPK value includes both 15-15-15 and other put together. n.a. Figures not available.

Table 35 : Agro-chemical imports into Ghana 1999-2007

	Year								
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Insecticide	1,203	1,195	907	1,090	5,829	610	5,982	6,921	9,979
Fungicide	718	673	618	1,345	1,673	770	1,713	2,148	2,575
Herbicide	195	224	598	582	2,472	1,096	5,340	8,780	8,932
Rodenticide	22	257	384	563	159	n.a.	13	78	123
Total	2,138	2,349	2,507	3,580	10,133	2,476	13,048	17,927	21,609

Source: GSS, Accra

n.a. Figures not available.

Imports of fertilizers totaled almost 190,000 tonnes and those of agro-chemical products – some 22,000 tonnes. While limited these volumes have to be added to the overall agriculture-induced demand for freight transport services.

5. Other agricultural sub-sectors and their output

Apart from the crops analyzed in the previous section, two other agricultural sub-sectors have impacted the overall transport output in Ghana: **livestock** and **fisheries**. Each of these two sub-sectors presents a different type of transport services. Live animals are usually carried in dedicated vehicles or adapted trucks. Fish products usually require refrigerated containers or vans.

5.1 Livestock

Tables below illustrate the evolution of livestock and meat production in Ghana in the years 1997-2007. All categories of livestock have recorded increases in head counts, although not of the same intensity. The fastest growth, despite competition from cheaper imported products (see an earlier part of this report), has been recorded in the case of poultry: + 133 per cent. The slowest growth dynamic has occurred in the case of cattle (+ 12 per cent).

The number of heads varies; goats represented over 44 per cent of the total livestock, followed by sheep (36 per cent). Cattle accounted for 14.8 per cent of the total, and pigs for 5.2 per cent.

The total number of livestock has, however, limited impact on transport demand, as it is slaughtered and consumed mostly locally and in larger agglomerations. The meat production reached 97.2 thousand tones in 2007. It was composed of various types of livestock, as below (percentage):

Table 36 : Composition of livestock

Livestock	Percentage
Poultry	30.5
Cattle	19.9
Pigs	17.0
Goats	16.8
Sheep	15.8
Total	100 %

Table 37 : Livestock population 1997-2007('000)

Type of Livestock	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle	1,260	1,273	1,288	1,302	1,315	1,330	1,344	1,359	1,373	1,392	1,407
Sheep	2,496	2,576	2,658	2,743	2,771	2,922	3,015	3,112	3,211	3,314	3,420
Goats	2,659	2,792	2,931	3,077	3,199	3,230	3,560	3,925	3,923	3,997	4,196
Pigs	347	339	332	324	312	310	303	297	290	477	491
Poultry	15,888	17,302	18,810	20,472	22,032	24,251	26,395	28,727	28,386	34,030	37,038

Source: Veterinary Services Directorate, MoFA, Accra

Table 38 : Index of livestock population (1997=100)

Type of Livestock	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle	101	102	103	104	106	107	108	109	110	112
Sheep	103	106	110	111	117	121	125	129	133	137
Goats	105	110	116	120	121	134	148	148	150	158
Pigs	98	96	93	90	89	87	86	84	137	141
Poultry	109	118	129	139	153	166	181	179	214	233

Table 39 : Meat production Ghana in 1997-2007

	Domestic Meat Production (Metric Tons)									
	1997	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle	17,160	18,029	18,570	19,053	18,288	18,486	18,686	18,874	19,140	19,346
Sheep	10,886	11,940	12,298	12,780	13,149	13,568	14,004	14,450	14,913	15,390
Goats	9,879	11,216	11,552	12,037	12,597	13,884	15,308	15,300	15,588	16,364
Pigs	11,360	11,173	10,056	9,653	10,416	10,181	9,979	9,744	16,027	16,498
Poultry	11,104	14,534	13,807	14,580	19,401	21,116	22,982	22,709	27,224	29,630
Total	60,389	66,892	66,283	68,103	73,851	77,235	80,959	76,582	92,893	97,229

Source: Estimates by MoFA

Domestic meat production, despite a substantial increase over the period under review, does not cover consumption needs. Imports are necessary. Table below includes data on meat imports into Ghana throughout the years 2000-2007. These imports, predominantly seaborne, have increased substantially over the years. They were indeed almost 10 times higher in 2007 compared with the beginning of the current decade.

Table 40 : Imports of livestock and poultry products 2000-2007

CATEGORY	2000	2001	2002	2003	2004	2005	2006	2007
Bovine								
Beef	631.6	73.2	901.3	1,112.40	2,586.80	6,331.70	10,585.50	16,250.40
Buffalo	237.9	81	162.2	249.6	1,169.20	2,257.10	4,717.30	8,109.00
sub-total	869.5	154.2	1,063.50	1,362.10	3,756.00	8,588.80	15,302.80	24,359.40
Poultry								
Chicken	9,160.00	6,731.50	19,986.00	32,939.00	39,088.60	40,591.00	44,757.70	63,276.30
Turkey	385.9	74.1	766.3	1,164.50	1,268.70	1,697.20	3,030.30	3,514.70
Duck	2.1	2	0	4.1	0	0	6.1	0
sub-total	9,548.00	6,807.60	20,752.30	34,107.60	40,357.30	42,288.20	47,794.10	66,791.00
Other								
Chevon	74.4	0	0	0	0	0	0	0
Mutton	237.4	478.2	1,285.00	2,122.30	2,053.40	3,640.80	4,839.20	6,887.10
Processed meat	106.8	80.4	133.9	0	256.2	270.4	0	0
sub-total	872.7	3,273.20	10,021.90	12,353.90	10,269.30	15,753.10	18,129.70	17,438.60
milk	96	1,548.50	865.5	349.4	203.3	1,555.10	1,044.20	2,659.90
pork	358.1	1,166.10	7,737.50	9,882.30	7,756.40	10,286.80	13,290.50	10,551.50
GRAND TOTAL	11,290.20	10,235.00	31,837.70	47,823.50	54,382.60	66,630.10	82,270.80	111,248.90

Source: Veterinary Services Directorate

In 2000 less than 1,000 tonnes of bovine products were imported into Ghana. By 2007 this volume increased 28 times to 22.4 thousand tones, or 22.4 per cent of the total volume of meat imports into Ghana. But imports of pork products grew even faster; almost 30 times over the corresponding period. Poultry imports grew 7 times over the same period.

Despite these imports the per capita consumption of meat products has declined. While this decline could have been provoked by changing consumption patterns, it could as well have been the result of relative impoverishment of certain poorer strata of the Ghanaian population which can ill-afford (more) expensive meat products.

5.2 Fisheries sub-sector

Fish comes from both the sea and inland water catches. Table below illustrates the evolution of annual fish catches by source (marine or inland) during the period 1997-2007.

Table 41 : Annual fish production by source (mt)

Source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Marine	396,000	376,000	333,000	380,000	366,000	290,000	331,412	352,405	322,790	315,530	293,398
Inland	72,000	76,000	89,000	88,000	88,000	88,000	75,450	79,000	82,654	83,168	84,757
Total	468,000	452,900	422,000	468,000	454,000	378,000	406,862	431,405	405,444	398,698	378,155

Source: Ministry of Fisheries.

There has been a steady decline in fish production in Ghana during the period under review. In absolute terms the output went down from the peak of 468,000 tonnes recorded in 1997 and 2000 to 378,155 tonnes in 2007, a 19.2 per cent decline. Considerable variations of output have been recorded but there has definitely been a downward trend in the overall fish production.

Characteristically, the decline in fish output is recorded only in marine catches. These have decreased by almost 100,000 tonnes, or 26 per cent. In the area of inland fishing there has been an increase of catches by 18 per cent, but this increase was not sufficient to compensate for the decline in marine fishing. The main reason for that is the sheer proportion between the two types of fishing: inland fish catches represent just ¼ of the total volume of catches.

When the figures above are related to statistics on the per capita consumption of fish, which is on the increase, it becomes apparent that the decline in fish catches has been compensated from imports. Regretfully, the ITPG Study Team have been unable to obtain relevant statistics on imports into Ghana of fish and fish products.

6. Exports of agricultural products from Ghana

While imports of food products increase their domestic consumption, exports do the opposite. Agricultural exports provide an important source of foreign exchange earnings. In 2007 alone exports of cocoa earned 26.3 per cent of all export earnings.

But cocoa and other industrial crops which are exported, have little impact on domestic consumption of agricultural produce and do not contribute to the attainment of food security other than through provision of foreign exchange that is used to buy food products which are in short supply, such as dairy products, meat, rice, wheat, fish.

Cocoa apart, Ghana is a net importer of food. Certain items, like rice, have seen import volumes soar. While staples such as wheat or dairy products are not produced locally⁵⁸, other products are in short supply mainly due to low or very low yields. Unless agricultural

⁵⁸ UNIDO sponsored a study few years back on substitution of cassava starch for wheat. While the results were encouraging, wheat flour has still to be imported to bake bread.

technology is dramatically improved, which requires huge capital investment, the danger of food shortages will be looming, particularly in the situation of the rapidly increasing population.

Generally speaking agricultural exports from Ghana are defined as **traditional exports** and **non-traditional exports**. The former include principally cocoa and its derivatives. These were dealt with in an earlier chapter of the present report devoted entirely to cocoa. The absolute volumes of these exports are determined by several basic factors of which acreage, yield and world prices⁵⁹ are of major importance.

Non-traditional agricultural exports are showing a strong growing trend. In the years 1998-2007 their value grew almost three-fold (see table below). They contributed, on average, about 20.0 per cent to the value of agricultural exports in Ghana.

Table 42 : Recent performance of non-traditional agricultural exports

Items	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Products	72	74	77	75	78	82	177	185	177	87
Number of Exporters	1,344	1,232	1,520	1,570	1,442	1,546	n.a.	n.a.	n.a.	n.a.
Value in US \$m. (Agric.)	77.8	84.5	74.5	67.3	85.7	138.1	159.8	151.9	203.4	197.3
Contribution(%Agric)	19.4	20.9	18.6	16.1	17.0	23.5	22.7	19.5	22.8	16.9
Total Value of all non-traditional Exports US \$m.	401.7	404.4	400.7	418.3	504.3	588.9	705.4	777.6	892.9	1,164.5

Source: Ghana Export Promotion Council, Accra.

But in terms of sheer volumes, non-traditional agricultural exports are insignificant. The total tonnage of these exports in 2007 reached a mere 314,000 tonnes, an equivalent of 15-17,000 TEU if all these cargoes were containerized, which is not the case. Detailed data on non-traditional agricultural exports are shown in table below.

⁵⁹ Prices of cocoa have recently taken a sharp downward trend. As recently as the beginning of April 2009 one metric tonne of cocoa beans fetched US\$ 1,906.00, a sharp decline from the peak of US\$ 2,672.00(29 per cent) in the matter of a few weeks.

Table 43 : Volume of main agricultural non-traditional exports (metric tonnes)

Commodity	1999	2000	2001	2002	2003	2004	2005	2006	2007	% Change 06 - 07
Horticultural:										
Pineapple	33,440	28,512	34,933	46,391	45,145	71,805	46,694	60,751	40,456	-33.4
Cotton Seed	17,699	10,051	15,578	6,297	9,145	9,933	7,355	5,354	5,337	-0.3
Kola nut	9,344	6,413	6,435	11,559	9,032	2,353	816	945	6,753	614.6
Yam	9,763	12,463	9,630	13,025	7,973	16,169	18,377	20,297	19,716	-2.9
Vegetable/ Condiment ¹	389	980	988	1,548	4,490	4,689	4,919	4,507	-	-
Oranges (Fresh or dried)	707	1,242	1,336	15,213	4,307	742	5,846	6,283	3,674	-41.5
Tinda	878	1,126	1,256	1,137	1,136	-	-	-	-	-
Tomatoes	471	2,033	4,539	4,961	4,369	607	0	-	6	-
Pepper/Chillies	2,420	2,819	5,281	4,687	4,674	282	483	-	43	-
Garden Eggs	1,338	1,080	1,295	1,512	1,867	697	124	92	92	0.0
Banana	3,383	3,883	3,251	3,233	364	725	1,117	44,098	52,069	18.1
Mangoes	167	268	232	126	234	376	407	182	824	352.7
Pawpaw	1,780	1,748	1,792	1,474	1,917	3,752	3,212	1,912	1,194	-37.6
Fish & Seafoods:										
Tunas Fish	15,409	13,733	16,881	17,810	13,431	26,600	19,448	45,476	45,119	-0.8
Fish nes	4,061	6,720	5,122	1,779	5,321	18,589	69,936	28,052	18,169	-35.2
Lobsters/Shrim ps, etc.	349	247	212	377	705	1,143	203	401	493	22.9
Processed Fish ²	2,859	5,198	6,027	5,328	6,043	1,790	10,584	9,673	-	-
Cuttle Fish/Octopus	18,53 ³	-	1,369 ³	449	795	4,485	594	1,284	896	-30.2
Processed & Industrial:										
Cashew Nuts	5,572	3,564	419	3,892	6,338	51,764	14,487	34,962	23,616	-32.5
Cocoa Waste	9,552	5,551	10,309	8,588	-	-	7,829	3,993	-	-
Raw/ Lint Cotton	8,818	10,847	10,323	3,640	40,302	3,551	3,862	5,793	3,772	-34.9
Robusta Coffee	6,650	6,742	3,036	1,326	769	682	585	214	1,464	584.1
Sheanuts	32,071	35,983	45,281	27,627	66,997	5,548	165,508	104,747	57,166	-45.4

Source: Ghana Export Promotion Council (GEPC), Accra.

¹ includes spices and excludes tomatoes, chillies, garden eggs and tinda from 1997.

² Processed Tuna not included.

³ Comprising only cuttle fish sales.

The following are the most important non-traditional exports (in brackets are their percentage shares in the total volume of these exports):

Table 44 : Volume of non traditional exports

Commodities	Volume and percentage
Sheanuts	57,166 (18.2)
Bananas	52,069 (16.6)
Tuna Fish	45,119 (14.4)
Pineapple	40,456 (12.9)
Cashew nuts	23,616 (7.5)
Yam	19,716 (6.3)
Other fish	18,169 (5.8)

The above 7 commodities, the exports of which show strong variations from one year to another, accounted for almost 82 per cent of the total volume of non-traditional agricultural exports from Ghana in 2007.

It is interesting to note that exports represent only a very small part of the crops. Exports of yam, for instance, represented less than 0.5 per cent of the total crop in 2007. No cassava exports were recorded that year. No data on other produce, such as, for instance cocoyam or plantain, were available. It can, however, be concluded from the above figures that volume-wise exports of non -traditional agricultural exports are negligible.

Agricultural commodities exported from Ghana, other than cocoa and some other industrial crops, do not constitute any major transportation challenge, especially from the international transportation point of view. Certain of these commodities, such as fish and fresh fruit, require refrigerated containers which are easily available bearing in mind large quantities of imported food products that require refrigeration. However, this does not mean that there are no logistics problems related to exports of food from Ghana. Most containers being suffed and unstaffed within the seaports' premises, this implies that fresh fish, fruit and other perishables have to be transported from the hinterland in refrigerated vans and then transhipped to containers. Needless to say that this situation causes wastage, delays and increases the overall cost of transport .

7. The impact of spatial factors in Ghana's agricultural activities upon demand for freight transport

The popular wisdom has it that the high cost of transport adversely affects the grow of industrial production in Ghana and further expansion of agriculture-based exports. The present paragraph is looking into this problem. However, the acute lack of relevant data precludes any empirical analysis that would either endorse or reject these claims.

Transport-related costs of agricultural production and marketing can be schematically presented as below:

Costs related to inputs:

- Transport of seeds, fertilizers, chemical products, etc.... from the point of origin (usually an overseas location) to the farm;
- Transport of seasonal workforce (if applicable) to the farm
- Transport of other equipment (machinery, if applicable) from the centre of distribution to the farm

Cost related to the transportation of crops to the market (processing plant, if applicable)

- Cost of extracting the crop and preparing it for pick-up at the farmgate
- Cost of transporting the crop to the market
- Cost of transporting the crop to the distribution/processing centre
- Cost related to preparation, packaging, labelling, quality control and the like, for export
- Cost of hauling the goods to the port/airport of export
- Costs related to handling, stuffing, securing the cargo etc. inside containers⁶⁰ (if applicable)
- Costs of loading containers aboard the ship.

If the commodities are exported on a f.o.b basis, the exporter's costs end here. But they will include the freight rate and discharge of containers at the port of destination, as well as insurance of the cargo, if the export transaction is arranged on a c.i.f basis, under a through B/L. There will be other cost elements until the final delivery of goods to the importer's premises.

Agricultural producers and exporters have very little impact on the cost of international transport, which can be prohibitive for certain export commodities, provided by international freight agreements (shipping conferences). If the export price is high enough to warrant the sale, it can still be profitable to export. But for low value commodities, such for instance as yam or plantain, the profitability of exports to overseas markets is usually ruled out, unless the country of import applies all sorts of incentives, tariff and non-tariff ones, as is the case of bananas exports from Central America. Thus transport may be, and usually is, a barrier to export of agricultural produce from Africa, and particularly West Africa to Europe and North America.

The figures below illustrate a typical marketing cost structure in the Ghanaian maize value chain. It involves price in US\$ per 100 kilograms of maize at particular stages of the value chain⁶¹:

⁶⁰ These costs may include cost of electric power to refrigerate containers while waiting for the ships to pick them up.

⁶¹ Based on research by the World Bank. See: Smallholder Agriculture in Ghana; op.cit; p. 3

	Price
Farmgate price plus	17.3
Handling and other costs	1.7
Transport	0.6
Commission and marketing fee	0.3
Storage, interest, losses	1.1
Wholesale agent fee	0.3
Wholesale profit	1.5
Techiman whole sale price plus	22.8
Handling, marketing fee...	0.8
Transport	1.7
Storage, interest, losses	0.9
Wholesale profit	0.7
Accra wholesale price Plus	27.0
Transport, Handling, marketing fee...	1.2
Storage, interest, losses	0.9
Retailer profit	1.9
Accra retail price	31.0

The above figures, despite some obvious shortcomings, reveal some most interesting conclusions:

- Transport and transport-related costs add only US\$ 3.5 to the retail price of 100 kilograms of maize transported from a farm to Accra. That represents 20.2 per cent of the farmgate price but only 11.3 per cent of the retail price in Accra.
- The above figures imply that non-transport components are mainly responsible for a near doubling of the retail price compared to the farmgate price; 88.7 per cent.
- Wholesaler and retailer profits represent 13.2 per cent of the retailer price; almost two percentage points above the share of transportation.
- Other cost elements, such as handling, storage, interest and losses represent 15 per cent of the retail prices in Accra.

The overall conclusion from the above analysis is that while the cost of transport is not a negligible component of the overall value chain for maize, it is hardly the main culprit. Rather, it is used as a convenient excuse for doubling of the farmgate price before reaching the retailer in Accra.

The latter has indeed very little impact on the wholesale price. But since competition is far from being perfect, the retailer, but also other players in the value chain, opts for the simplest solution: instead of rigorously applying cost control measures on the whole chain he, likewise the other agents, simply passes his cost on the consumer who is the biggest loser under these arrangements.

It would be most instructive to make similar value-chain studies for other commodities. Only such objective studies could reveal the actual impact of transport costs on the retail prices of foodstuffs, and not only, to their final consumer.

Returning to the main issue in this section, viz. the impact of spatial factors on transport costs and demand, it is important to note that agriculture in Ghana, due to climatic, geographical but also human factors, depends on efficient and easily available transport services.

8. Changes in cropped area of main crops in Ghana 2005-2008

Cropped area and changes in crop location are one of the main factors that generate transport demand by the agricultural sector. The analysis will be therefore carried out according to particular crops rather than on a region by region bases. The main reason for such an approach is the relative importance of each and every commodity for the overall food supply in Ghana and, because of the physical separation between the production and consumption areas, also for the transport demand generation by the main crops.

8.1 Maize

Between 2005 and 2008 the cropped area for maize shrank overall by 2.2 per cent nationwide. But this process occurred with different intensity from one region to the other. While the Northern Region, for instance, has lost almost 26 per cent of area cropped for maize over that period, the Upper East gained close to 36 per cent. In absolute terms the biggest loss of area planted with maize has been in the Brong Ahafo region where it has shrunk by over 29,000 hectares. The Northern Region followed with a net loss of over 27,000 hectares. Notable losses of area cultivated for maize have been recorded in the Western, Ashanti, Upper West and Eastern regions. Different reasons are responsible for those losses: mining activities, changes to industrial crops (cocoa and oil palm), or crop substitution.

8.2 Rice

Rice is cropped on some 127,000 hectares in Ghana. The cropped area has shrunk by 21.3 per cent or 10 times more than it was the case for maize. The main reason for that is that rice requires irrigation and only insignificant portion of agricultural land in Ghana is irrigated. But rice is a high yield crop and could contribute much more to food security in Ghana than it is currently the case. It should be reminded that the bulk of rice marketed in Ghana comes from imports. The biggest area lost to rice crops has been in the Brong Ahafo region: a whopping 21,000 hectares (86 per cent), followed by the Upper East where the rice cropped area has shrunk by 17,500 hectares (40 per cent). The Eastern Region more than doubled the cropped area for rice and the Volta Region increased the acreage by 42 per cent. These gains have, however, been insufficient to compensate for losses recorded in other regions.

8.3 Millet

There has been an increase of cropped area for millet of 3.7 per cent during the period under review. This increase has gone to two millet growing regions: Northern and Upper West, while the Upper East Region has lost 8.3 per cent of millet acreage. There is no millet production in any of the remaining regions in Ghana.

8.4 Sorghum

Sorghum is cropped in only the three northern regions and in Volta Region. Overall cropped area has shrunk by 5.2 per cent. Like millet sorghum has to be shipped to consumption centres outside these regions which involves long hauling distances.

8.5 Cassava

Although cassava is the main crop from the point of view of its volume (close to 10 million tonnes) the total cropped area has shrunk between 2005 and 2008 by 214,000 hectares (over 23 per cent). That explains well the loss of output of over 4.5 million tonnes during the period under review. The Eastern Region accounts for almost $\frac{1}{4}$ of the loss of the cropped area which is in line with the 32 per cent loss of output. Ashanti followed with an over 20 per cent loss of the cropped area. The Northern Region has lost 18 per cent of the cropped area for cassava, while the Volta Region recorded a 24 per cent gain.

8.6 Yam

With almost 5 million tonnes of output, yam is the second most important crop in Ghana in terms of tonnage. It is noteworthy that the level of output has not decreased significantly over the period under review, despite a 5 per cent shrinkage in the cropped area. The most notable decrease in this area has taken place in the Brong Ahafo Region (7.0 per cent). The other regions that have recorded losses in the cropped area for yam, although to a lesser degree than Brong Ahafo, were Ashanti, Upper West, Eastern and Central regions. Volta Region has noted an increase of 5 per cent in the cropped area for yam.

8.7 Cocoyam

Unlike most of the crops analysed so far cocoyam has recorded an increase of the planted area of 16.3 per cent. That found its repercussion in the increase of the output, but the increase was quite modest: just 3.7 per cent. The most spectacular increase of cropped area for cocoyam has been in the Eastern Region: almost 34,000 hectares, or 21.5 per cent. The other regions that had increased the cropped area for cocoyam were Brong Ahafo and Western, Ashanti being the loser.

8.8 Plantain

Area cultivated with plantain had dropped by 16.7 per cent between 2005 and 2008. The biggest loss (24.7 per cent) took place in Ashanti, followed by Brong Ahafo and Western, although with smaller decreases. Volta Region has increased the cropped area for plantain.

8.9 Ground nuts, cowpea, soyabean

These crops have all recorded increases in planted area of 38.6, 20.4 and 20.6 per cent respectively. Only the three northern regions: Northern, Upper East and Upper West grow these crops which have to be shipped to the other parts of the country, thus contributing to the overall demand for transport services. These crops are partially used for processing, therefore have to be shipped to processing facilities.

The above brief analysis of changes in cropped area for major crops grown in Ghana implies that demand for transport by these crops also undergoes changes. But it would be meaningless if it was not compounded with the analysis of output. The latter is a function of cropped area and average yields.

9. Changes in output for major crops in Ghana 2005-2008

9.1 Maize

Following the decline in the cropped area for maize and the average yield, the production of maize in Ghana has fallen between 2005 and 2008 by 426,000 tonnes or 25.7 per cent. That is a highly worrisome trend remembering that maize is a protein-rich staple with multiple use. Shortages have to be covered by imports, mostly from USA, Canada and Europe.

Three main regions: Brong Ahafo, Eastern and Ashanti accounted for more than 70 per cent of the total production of maize in Ghana. But each one of them recorded losses in output. On the consumption side the Greater Accra region is the main consumer of maize with its own production covering a mere 0.2 per cent of the country's harvest. It should be added that the average yield shrank by 1.7 per cent in 2008 as compared with that recorded for 2005. Big differences exist in terms of average yields for maize; from a low of 1.16 mt/ha in the Upper East region to a high of 1.97 mt/ha for Brong Ahafo and the Eastern Region.

9.2 Rice

Production of rice decreased by 10 per cent in 2008 compared to 2005, despite a 14.7 per cent increase in the average yield. The main reason for that decline has been the shrinking cropped area (see previous paragraph). Rice is produced mainly in the Northern and Upper East regions which account for nearly 63 per cent of the country's rice output. It is noteworthy that yields in rice farming are even more pronounced than it is the case of maize. Ashanti has the lowest average yield in rice; more than 2.2 times less compared to the Upper East Region.

9.3 Millet

Millet production increased between 2005 and 2008 by more than 30 per cent. All the millet producing regions: Northern, Upper West and Upper East have recorded increases of output. These increases have been obtained through improved yields and larger cropped area under cultivation in 2008, as compared to 2005.

9.4 Sorghum

Production of sorghum increased in the period under review by 21.7 per cent. This substantial increase has been possible exclusively through improved yields (28 per cent), since the cropped area decreased in the corresponding period by 5.2 per cent. Sorghum, like millet, is produced exclusively in the three northern regions.

9.5 Cassava

According to data provided by the Ministry of Food and Agriculture the production of this staple decreased by an astounding 33 per cent in 2008 compared to 2005. Serious doubt is cast on reliability of such data as information presented earlier indicates that there was an increase in cassava output in 2007. These discrepancies notwithstanding, cassava is by far the most important crop in Ghana with outputs in excess of 10 million tonnes. Cassava is grown throughout Ghana with the exception of Upper East and Upper West regions. It is a highly nutritional staple present in the daily diet of many Ghanaians. The major cassava producing regions are Eastern, Brong Ahafo and Volta region.

9.6 Yam

Next to cassava, yam is one of the principal crops in Ghana. Total production of yam in 2008 amounted to 4.9 million tonnes, an increase of almost 5.7 per cent. Improved yields (11.3 per cent) made up for reduced cropped area of yam. Like cassava, yam is a major staple in everyday diet of Ghanaians. Brong Ahafo, Northern and Eastern are the main yam producing areas.

9.7 Cocoyam

It is another important crop with the output of nearly 1.6 million tonnes in 2008. Increased cropped area (16.3 per cent) made up for the decreased yields. Ashanti and Eastern are the main cocoyam producing regions of the country.

9.8 Plantain

Third most important staple in Ghana with outputs over 3 million tonnes a year. There has been, however, a decline in the volume of plantain production by 11 per cent, mainly due to a

reduced cropped area (16.7 per cent) in spite of an improved yield. The main plantain producing areas are Ashanti, Brong Ahafo and Eastern Region.

9.9 Ground nuts, cowpea and soya beans

These crops have all increased in output. Total production of the three items amounted to over 800,000 tonnes. Ground nuts particularly made great inroads with the output having increased by 65 per cent in 2008 compared to 2005.

10. Conclusion

Agriculture is, and will remain for many years to come, the main sector of economic activity in Ghana. As such it will exert considerable influence upon the transport sector.

Transport, and in particular its inadequate state, is seen by many as a major obstacle to further expansion of the agricultural sector. The ITPG Study Team do not totally share this opinion. Transport in Ghana is hardly a greater problem for agriculture than for any other major sector of the country's economy, save the mineral sector, with definite demand for transport now and in the years to come.

But the inadequate provision of transport service may adversely affect what is termed a "post-harvest management" of crops. Because of the low unit value of many crops these are highly sensitive to high transport prices in Ghana. This is, however, quite a different matter which goes beyond the scope of this commodity report.