Gabon corridors performance evaluation: New strategic approach based-supply chain and transport logistics efficiency

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This paper is aimed at evaluating Gabonese corridors’ supply chain and transport logistics efficiency. The main purposes of this paper are to: (a) carry out investigations and develop enabling environment strategies; (b) suggest a strategy for boosting investment to ameliorate efficiencies. The scope of the measurement includes: supply chain efficiency (corridor infrastructure; enabling environment; stakeholders; the transport industry) and transport logistic. The principal objective of this study is to help the Gabonese Government in developing the strategic plan for the Gabonese corridors. Results from the present study obviously show that the inter-connection between the enabling environment (road, transport industry services, port and rail transport infrastructure, and the level of services) available to stakeholders have all combined to have an unfavorable effect on transport logistics services in the Gabonese corridors.

Keywords: Gabon corridors, performance evaluation, strategy, supply chain, transport logistics

INTRODUCTION

This paper aims to develop a strategic plan for the Gabonese corridors. The main objective is to increase Gabonese’s both public and private sector competitiveness by strengthening targeted commodities value chains. The scope of this measurement contributes to the efficiency of the Gabonese commodities supply chain by evaluating the transport demand and the supply characteristics of the corridors’ supply chain and transport logistics with a view towards improving corridors efficiency.

Gabon faces many challenges to compete efficiently in the world markets. It experiences high trade transaction costs, with logistics representing an important ratio of the Gross Domestic Product, which at times can more than double that of other developing countries.

Gabonese transport corridors serve both domestic and foreign trade. They are composed of domestic segments which serve more national traffic. As a result, they serve competing local demands, and endure conflicting objectives for their development, diverse agencies responsible for their maintenance.

Cooperation between Sub-Saharan nations, through corridor-based actions can lead to significant transit advantages for Sub-Saharan sea docked countries. Given the challenges facing Gabon, influencing and sensitizing Gabonese policy makers on how to improve access necessitates specific data on constraints to the smooth flow of traffic. Relevant data can assist in diagnosing the factors of the national systems that are not functioning well so that infrastructure, institutional or regulatory reform interventions can be better addressed.

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Generally, a corridor’s performance can be assessed from two principal perspectives: an infrastructure perspective, which involves the physical capacity of nodes and links in a corridor. A service perspective, which analyses the services quality provided for products moving on the diverse itineraries. Performance is assessed in terms of average cost and time for transport units moving through these corridors.

The principal tasks of this measurement were to examine the constraints to the efficient functioning of the Gabonese corridors, encompassing policy and regulatory problems, coordination of infrastructure capacity, efficient management of existing railways, roads, logistics services and port infrastructures.

The specific objectives of this study are to:

a) Carry out studies and develop enabling environment strategies
b) Propose a strategy for boosting investment to ameliorate efficiencies.

These two objectives were addressed using a methodical process of collecting and analyzing data based on interviews with both public and private stakeholders.

The organization of this paper is as follows: Section 1 above presents the background and introduction to this study. Section 2 presents a theoretical framework of the transport corridors, transport logistics, and supply chain management strategies. Section 3 presents the research methodology. Section 4 presents the comprehensive analysis. Finally, section 5 presents the main conclusion arising from this study.

LITERATURE REVIEW

Transport corridors

Trade is dependent considerably upon the diverse transportation corridors and networks, on the inland waterways, on sea, across the air, or on the land (Rodrigue, 1999).

Transport systems have offered distribution, and are regulated. According to Kenneth (2001), the regulation and structure of the transport system are likely to be affected by the territory’s spatial structure. Transport is a major component that strengthens spatial imparity by connecting a priori the most productive places.

From an economic view, transport corridors provide two critical characteristics for development: land supply and lower distribution costs for diverse activities (Gillen, 1996). Because spatial accumulation tends to occur at productive places, when there is appropriate land supply, corridors are in that circumstance an evident choice of local structure (Rodrique, 1999).

The transport corridors’ emergence is the cover in space and time of various modes to a point where the corridors become the regional structure. As reported by Jennifer et al. (1986), historical and geographical conditions create a fundamental set of regional imparities that the consecutive demographic, economic and transport developments could reinforce.

Types of transport corridors

A transport corridor can be defined as a set of routes between hub centers where fluvial, maritime, air and land transportation systems converge (Fleming, 1999). The corridors structure lies within a set of interconnecting hub centers where modal interactions converge. Hub centers can be categorized in diverse modal structures: fluvial, maritime, air and land corridors.

Maritime corridors

Maritime transportation enables the establishment of trading connections between countries and continents.

Ports are generally the facilities connecting an economic system with the global market and accordingly represent the principal trade’s hub centers (Rodrique, 1999). Ports are above multimodal convergence places of inward transportation (Hayuth, 1987). Along with the economic growth, the demand for port system is increasing. The capacity of ports to convey commodities requires a limit to economic development.

The strategy is accordingly to enable the port’s multimodal capacity to fulfill the demand of the hinterland and foreland with a dependence on the infrastructures logistics performance for shipment and transshipment.

The maritime transportation logistics have experienced considerable changes during the last twenty-five years and numerous ports have specialized in the transshipment activities (Hayuth, 1987). Containers ensure flexibility of shipments and numerous ports have chosen this multimodal transportation technology to reinforce their status of hub centers.

The maritime corridor is a route between maritime hub centers, which are places of transshipment functions (a maritime interface where maritime corridors are linked with land and fluvial corridors). The rapid growth of several regional ports provides the fundamental cargo conditions for incorporation in new mainline networks. These ports provide new alternatives for maritime corridor development (Frankel, 1999b).

Inward waterways

An inland waterway offers a high capacity flow. Ports play the role of hub centers by providing maritime/fluvial and land/fluvial interfaces. The land/fluvial interface generally relies less on transshipment infrastructures and is more flexible.
Ports are less appropriate to fluvial transportation but nowadays fluvial hub centers are increasingly experiencing integration with land and maritime transportation. Numerous industrial regions are emerging along fluvial axis. Even if inward waterways are the traditional transportation network to be of importance still, roads and railways have minimized their significance.

The European Union situation relating to inward waterways corridors is a good example. Waterway traffic among Belgium, Netherlands, and France is regulated by deceitful agreements among concerned participants. River-sea navigation is also furnishing a new dimension to fluvial transportation by establishing an interface between maritime and fluvial systems (Janelle and Beuthe, 1997).

Land corridors

Land transportation corridors can be divided into road and rail.

Road

Road transportation is the most flexible land transportation mode (OECD, 1992). Its significance has increased with the disjunction of economic systems over large regions and the growth of the industrial sector. It often handles small shipments between numerous areas.

Road transportation generally provides haulage services. The corridor linked with road transportation is not confined to places adjacent to larger road axes, but also to points situated within a peripheral area. Road hub centers are crossroads which locate truck yards and warehouses. But Black (1993) proposed that integration with other modes encourages the convergence of regional road transportation towards hub centers of other modes (ports).

Rail

Rail transportation offers concurrently capacity and speed, but at the cost of flexibility. It offers an effective interface between land and maritime transportation systems. Rail logistics are complicated and require network management strategies under numerous capacities constraints, nature of shipments, origin and destinations, schedule (Henstra and Woxenius, 1999).

Air corridors

Air transportation offers a fast way to connect international markets and countries. The strategy of the international airports is to reinforce regional connections, develop new domestic and international services for freight and passengers, to increase their capacity (David, 2009).

The strength of the air transportation hub is connected to its accessibility, thus reinforcing the role of airports in economic development.

Fleming and Hayuth (1994) have discussed how intermediacy and centrality are two important influences upon the location of many transport hubs. They also proposed that proximity to larger facilities (in contrast to smaller ones) could also be another crucial component. They think that the impact of these concepts changes over time, and that the patterns of air corridors change with them.

Multimodal transport corridors

The significance of intermodal and multimodal transportation is well established. The utilization of containers indicates the complementary between freight transportation modes by providing a greater fluidity to standardization and movements of loads.

Multimodal transport generally enables economies of scale within a transportation system. Travel time and costs take a great importance in the trade globalization and accordingly in transportation. This is more consolidated by “door-to-door” service and “just-in-time” production that necessitate a low inventory level and movements between many points of origin and destination. Facing those revolutions, transportation and industrial companies must re-assess their strategies for freight transportation. The development of innovative multimodal and modal infrastructures on a global scale has enabled the accessibility to world market; numerous international transportation parameters have been modified (Mahoney, 1985).

The objective of a transport system is to connect economic activities, therefore supporting numerous of communication points along multimodal transport corridors. Multimodal transport corridors will furnish a penetration axis for disintegrated production systems over a region. Communication points will play an important role in a local economic system. The tendency for a communication point is to develop its transshipment functions between hinterland and foreland (Hayuth, 1987).

Rodrigue (1999) proposed that as long as an economic system necessitates the distribution of goods, information and people, communication and transport would play a role in the regulation and structure of regions. Bottlenecks that may occur along a transport corridor will denote higher distribution costs.

Interconnections between transportation and logistics

Without well built transportation systems, logistics could
not bring its benefits into complete play. A well organized transport system in logistics activities could provide potential logistics efficiency, promote service quality and minimize operation cost. The amelioration of transportation systems requires the effort from both private and public sectors. A well-operated logistics system could maximize both the competitiveness of the Government and companies.

**Products characters and transport costs in logistics systems**

Transport system is the most crucial economic activity among the factors of business logistics systems. According to Chang (1998), the transportation cost, on average, accounted for 44% of logistics costs and 6.5% of market revenue. This analysis indicates that transportation is the highest cost. The transportation cost here encompasses the corridors, pallets, containers, terminals, labs, means of transportation, and time. This design also signifies the importance order in improvement processing. It occupies a crucial ratio in logistics activities. The amelioration of the item of higher operation costs can get better impacts. Hence, logistics managers must understand transport system operation exhaustively.

**The impacts of transportation on overall logistics activities**

Transportation fulfills a connectional role among the numerous steps that result in resources transformation into valuable products in the name of the end consumer. It is the planning of all these functions into a system of products movement that constitutes the concept of business logistics (Fair and Williams, 1981).

Generally these actions involved separate firms for production, storage, transportation, wholesaling, and sale, but fundamentally, manufacturing plants, warehousing services, merchandising institutions are all about doing transportation (Fair and Williams, 1981).

**The function of transportation in service quality**

The role that transportation fulfills in logistics system is more complicated than transporting products for the clients. Its complicatedness can take effect only through greatly quality management. Through methods of well-handled transport system, products could be conveyed to the correct place at the correct time in order to satisfy the demands of customers. It builds a bridge between manufacturers and consumers. Accordingly, transportation is the foundation of economy and efficiency in business logistics. Furthermore, a well-handled transport system performing in logistics activities brings advantages to both service quality and firm competitiveness (Fair and Williams, 1981).

**Current methods for evaluating corridor performance**

Corridor performance evaluation can take two forms: (a) corridor-wide evaluation and (b) detailed evaluation at specific locations, within a corridor. Corridor-wide evaluation encompasses data collection and surveys covering the corridor’s length, while bottlenecks evaluation, on the other hand, includes data at specific locations that restrict transit movement.

Three principal methodologies have been used to date, with diverse costs and focuses:

1. Constraint evaluation based on independent surveys; the focus is generally on border-crossing time
2. Corridor-wide evaluation based on freight forwarders interviews and cooperation with port customs and authorities.

In the primary case, chosen drivers fill journey sheets in which they report all stops. In the second case, external topographer reports transport costs and time. This approach is generally used for border-crossing time.

In the third case, freight forwarders’ interviews, trucking firms managers, managers of port authorities or customs are carried out in order to collect transport / traffic time, cost, and data of clearance time.

The principal dissimilarity lies in the fact that the first two methods principally consist in generating data while the third approach principally consists in collecting existing data. For the first alternative, the institution in charge of assessing corridor performance generally liaises with national institutions, which conduct survey works.

For the second alternative, topographers are recruited temporarily. In the third case, the institution collects data already gathered by port, customs, and private sector operators.

Generally, data precision with road transport drivers’ journey diaries is far more ambiguous than with surveys conducted with trucking and freight forwarders firms.

Interviews results of freight forwarders or manager of trucking firms depend on data requirements: to get an idea of average corridor transport time and costs, casual and unorganized interviews can be successful. It only necessitates that a working connection already exists between transport specialists and private sector operators from corridor institutions. Regarding more detailed data such as vehicle operating costs, border-crossing time, and port clearance, more casual and organized interviews need to be achieved due to the use of computer-based (Arvis et al., 2007; Hartmann, 2007).
Supply chain management strategy

Supply chain management

Since the last decade, the domain of supply chain management has become famous. This is attested by increases in academic publications. Much of the knowledge about supply chain management resides in various fields such as logistics, purchasing, IT and marketing.

From a conceptualization view, the definition of the supply chain management is ambiguous and the effect of theoretical diversity is such that it is unclear supply chain management based on a systematic theory. From a research methodology view, it is ambiguous how the techniques used have formed supply chain management concepts.

From a meta-analytical view, the effect on reinforcing knowledge collected along functional disciplines raises problems as to if supply chain management has a consistent, overarching philosophy of knowledge framework.

Numerous review articles published in recent and last twelve years appear to partially address conceptual problems and do not address methodology problems at all. For instance, Lummus et al. (2001), Mentzer et al. (2001) and Janvier-James (2012) focus particularly on the definition of supply chain management. Giannakis et al. (2004) and Injazz et al. (2003) take a strategic management view to address theory development in the supply chain management area.

The concept of supply chain management appears to be a consensus on its definition (Stephen et al., 1997; Lummus et al., 2001; Mentzer et al., 2001; Janvier-James, 2012).

Mentzer et al. (2001) and Janvier-James (2012) attempted to propose a definition that is broad and appropriately reflecting the issues that are generally covered under this concept.

By adopting Janvier-James (2012)’s definition, we can define supply chain management as a chain of facilities and distribution alternatives that perform the functions of obtaining products, transformation of these products into intermediate and finished goods, and the distribution of these finished goods to customers.

Main supply chain management strategies

Supply chain has been built in two principal schools of thought, namely Agility and Lean Thinking. These two strategies are analyzed from a conceptual level to a tactical and operational level. The potential effect of these strategies on transport is proposed in this study.

Agile supply chain

Agility has come as a new model under the existing market conditions in many sectors. Naylor et al. (1999) define agility as using a virtual corporation and market knowledge to achieve beneficial opportunities in a changeable market place. Christopher et al. (2000) declared that agility is a business-wide aptitude that includes information systems, organizational structures, logistics processes. An important feature of an agile organization is flexibility, and certainly the origins of agility lie in flexible producing systems. But, agility definition does not mention clearly the features and attributes of this supply chain strategy.

Supply chain integration

The concept of Integration has been studied broadly in the field of supply chain management. Integration is generally characterized by collaboration, information sharing, cooperation, trust, shared technology, partnerships, and a basic shift away from controlling individual operational processes, to controlling integrated chains (Akkermans et al., 1999). The efficiency of the response of an organization to hastily changing market conditions will be determined by the capacities of trading partners. A producer with suppliers that have poor delivery records and quality will find it complicated to provide high levels of customer service (Damien, 2005).

Wood (1997) enunciated the importance of KPIs alignment across departments through collaboration and cooperation, and declared that commonly producing and sales have had poor targets alignment.

The principal objective of strategic collaborations is to control and optimize costs agreeably, while concurrently reinforcing the market positions of partners (Zinn and Bowersox, 1988). Logistics has emerged as a key developing block of numerous seller-buyer agreements (Bowersox et al., 1995).

Lean supply chain

The Lean Thinking theory has emerged with time. The expression “lean production” was primarily used to depict the process of reduction of waste in the automotive industry. Jones et al. (1997) assert that Lean thinking has a natural beginning point with value for the customer looking at the whole processes. But, Leanness signifies building a value stream to remove all waste, encompassing time (Naylor et al., 1999).

Hines et al. (2004) declared that Lean exists at two levels: operational and strategic. The customer value-creation strategic thinking can be applied everywhere, but, Lean Thinking cannot be adapted to all kinds of products. Designing a supply chain strategy consists of matching market features (demand variability and products attributes) with supply (Fisher, 1997). Therefore, the goods can be adapted to the lean environment, and accordingly,
the process can be managed by the lean-thinking level schedule requisites (Suzaki, 1987).

RESEARCH METHODOLOGY

The methodology used in this paper is based on Grounded theory. Glaser (1998) defines Grounded theory as a general method of comparative analysis to discover theory with four central criteria: work (generality), relevance (understanding), fit (valid), and modifiability (control). It is one of the interpretive methods that share the common philosophy of phenomenology. It is a "do-it-yourself methodology" where no research assistant, no research grant, no dues, and no secret handshakes are needed. Grounded Theory becomes an answer where other methodologies did not work well enough, especially in the sensitive dependent variable fields within the health science and business and management. In other words, grounded theory is constructed or 'grounded' from the data of participants who have experienced the phenomenon under study. In that theory, data collection involves the collection of information from secondary sources, interviews, observation and documentary data.

Measurement hypothesis

In this study, the measurement was conducted on the hypothesis that the Gabonese corridors can be situated along an S-curve shaped expansion path that includes the main stages of corridor development: transport corridor, a multimodal corridor, a logistics corridor and an economic corridor. Each corridor development stage has distinctive efficiency and operational characteristics. The principal measurement hypothesis is that Gabon corridor is practically a multimodal corridor due firstly to the predominance of road freight services, railway services and a port system it lacks the efficient coordination to be a logistics corridor as demonstrated in Figure 1.

This measurement analyzes the characteristics of the infrastructure supply, the freight demand; functional and performance characteristics of the corridor to measure the constraints restricting the normal functioning of the Gabon corridors as a logistics corridor as demonstrated in Figure 1.

To address the hypotheses the focal point of this measurement were on 4 main aspects of the transport logistic supply chain: (a) infrastructure; (b) the enabling environment; (c) the industry of transport and (d) logistics services providers and main shippers (extractive industries).

Data collection

In this study, the data collection included: (a) a review of published data and studies and (b) interviews conducted with stakeholders. The methods of interviews involved direct phone calls and face to face interviews and data collection was conducted in Gabon from August 10th to 30th, 2011. About 30 interviews of public sector executives, commercial owners, shipping agents, freight forwarders, and transport service operators were conducted.

Key variables

To conduct the analysis 7 key variables were measured across the whole logistics supply chain as the foundation to test the hypothesis and measure the efficiency of the Gabonese corridors. These variables encompassed: (a) collection handling and shipping activities from the production or extractive points to main collection points (markets); (b) road freight services (c) railway operations; (d) conditions of road; (e) port operations; (f) trade facilitation; (g) container terminal operations.

The analyses conducted encompassed comparative transport cost analysis, transport demand analysis; benchmarking operational performance, service level and capacity analysis.

Methodical survey instruments

Due to the importance of stakeholders in supply chain and transport logistics and in order to drive policy, institutional reform and attract investments in the Gabonese corridors a strategic approach is necessary. Such a strategic approach must include traders, shippers and consignees; transport and logistics service providers; infrastructure; and national institutions, policies, and rules.

The survey instruments have been developed in 4 aspects, which align with the 7 variables and the hypothesis formulated above. The 4 aspects are (a) infrastructure; (b) the enabling environment; (c) the transport industry; and (d) stakeholders (corridor users such as shipping agents and transporters). We postulate that the interconnection of these aspects determines the performance and efficiency of the logistics supply chain, as assessed in terms of reliability, responsiveness, and cost efficiency.

Furthermore their respective efficiency and performance measures disclosed both the coordination and integration level, and the services capacity within the supply chain and transport logistics.

Analysis

Infrastructures

Gabon national road network

Of the 9,170 km of public roads (excluding urban roads)
that encompasses Gabon in 2004, there were 1,173 km of paved roads, of which 163 are under work, against 7459 km of unpaved roads (Table 1). The network serves almost all of the space of Gabon, with the exception of the province of Ogooué-Maritime. The range of the road network takes its starting point in Libreville. It is divided into three categories, including national roads, secondary roads and local roads. In addition, the mesh of Gabon is one of the most under-equipped in the world, that is to say that the networks are not developed. The arteries in the network are insufficient. The roads are not real intense organic connection to the national level. The

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Quantity (km)</th>
<th>Service for a theoretical unit infrastructure (km²/km)</th>
<th>(Inhabitants/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterway</td>
<td>3300</td>
<td>81km²/km</td>
<td>306 inhab/km</td>
</tr>
<tr>
<td>Railway</td>
<td>658</td>
<td>407km²/km</td>
<td>1520 inhab/km</td>
</tr>
<tr>
<td>Roads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved roads</td>
<td>1173</td>
<td>228km²/km</td>
<td>1023inhab/km</td>
</tr>
<tr>
<td>Unpaved roads</td>
<td>7459</td>
<td>36km²/km</td>
<td>161inhab/km</td>
</tr>
<tr>
<td>Total roads</td>
<td>9170</td>
<td>29km²/km</td>
<td>130inhab/km</td>
</tr>
<tr>
<td>Airports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International airports</td>
<td>3</td>
<td>89222km²/km</td>
<td>337000</td>
</tr>
<tr>
<td>Regional airport (public)</td>
<td>26</td>
<td>10295km²/km</td>
<td>38885</td>
</tr>
<tr>
<td>Privates airports</td>
<td>73</td>
<td>3667km²/km</td>
<td>12849</td>
</tr>
</tbody>
</table>

Table 2. Differences in allocations of roads (including urban roads) by province.

<table>
<thead>
<tr>
<th>Province</th>
<th>Linear Population</th>
<th>Km²</th>
<th>Km²/km</th>
<th>Inhab/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estuaire</td>
<td>750</td>
<td>463187</td>
<td>20740</td>
<td>28</td>
</tr>
<tr>
<td>Woleu-Ntem</td>
<td>1060</td>
<td>97271</td>
<td>38465</td>
<td>36</td>
</tr>
<tr>
<td>Haut-Ogooue</td>
<td>1620</td>
<td>104301</td>
<td>36547</td>
<td>23</td>
</tr>
<tr>
<td>Moyen-Ogooue</td>
<td>400</td>
<td>42316</td>
<td>18535</td>
<td>46</td>
</tr>
<tr>
<td>Ogooue-Maritime</td>
<td>40</td>
<td>97913</td>
<td>22890</td>
<td>572</td>
</tr>
<tr>
<td>Ogooue-Ivindo</td>
<td>1090</td>
<td>48862</td>
<td>46075</td>
<td>42</td>
</tr>
<tr>
<td>Ogooue-Lolo</td>
<td>600</td>
<td>43915</td>
<td>25380</td>
<td>42</td>
</tr>
<tr>
<td>Ngounie</td>
<td>1490</td>
<td>77781</td>
<td>37750</td>
<td>25</td>
</tr>
<tr>
<td>Nyanga</td>
<td>610</td>
<td>39430</td>
<td>21285</td>
<td>35</td>
</tr>
</tbody>
</table>


spatial organization is far from taking into account the dialectic infrastructure-networks, since the detection of traffic lanes reveals incomplete and poorly coordinated (Djeki, 1997; Le Commissariat Général au Plan et au Développement, 1999).

The road density is low compared to the population (7 km to 1000 inhabitants) and the country superficies (1 km to 35 km²) (Commissariat General au plan et au development,1999). In detail, the equipment is relatively poor in terms of superficies, as shown in Table 1. The average coefficients hide regional disparities. Table 2 summarizes the allocations for roads by province. It highlights the under-staffing of Ogooué Maritime road in equipment, partly offset by the use of the waterway.

Gabon corridor railway

The Gabonese railway (actually named SETRAG) was first planned in 1885. Exploration into the line was conducted in 1968, funding was agreed in 1973 and building began the following year. Inaugurated in 1978, the 670 km Gabonese railway is the country’s only railway (Berger World, 2011). The first portion, from Owendo to Ndjolé, was inaugurated in 1978, with the remaining portions opening in stages until 1986 (Jane, 2011).

The railway conveys about 3 million tons of freight; principally manganese ore, timber and uranium, and nearly two hundred thousand passengers per year. A permit to operate the railway was signed in 2005, and then, the concessionaire SETRAG initiated a program of maintenance and investment to enhance capacity and ameliorate the railway’s efficiency and reliability (Berger World, 2011).

The Gabonese railway is adjacent to the Ogooué River down the city of Ndjolé. Most important constructions are the Juckville Tunnel, the viaduct over the Abanga swamp, and the bridge over the confluence between the Ivindo and the Ogooué Rivers (Jane, 2011).

In order to ease the exportation of manganese ore, it was first decided to build a cableway from Moanda to Mbinda, and then section of the Congo-ocean railway to Mont-Bello, from which the actual railway would connect to the Pointe-Noire port in Congo. The conveyor was conducted via the town of Bakoumba, which became the centre for the structure maintenance. The mine was inaugurated in 1957, and the cableway was opened in 1959. The connection was finally completed when the railway of Congo-Ocean section opened in 1962. The cableway included ten portions, and had 858 supports of between 5 and 74m in height. One ton cars carried the ore twenty-four hours a day. The government of Gabon was enthusiastic to ship the precious manganese ore through its own ports (port of Owendo), and conducted a new railway, the Gabonese railway (SETRAG), from Libreville to Moanda, and on to Mbinda. When this began, in 1986, the cableway was stopped. While Moanda continued to progress, Bakoumba and Mbinda suffered from the retraction of their principal industry (Ya Sanza, 1962).

Nowadays, The Gabonese railway provides an export outlet through the Gabonese port of Owendo. The use of the railroad has cut shipping costs by $20 million per year. In 2000, 1.7 million tons of metallurgical-grade ore were extracted, down from 2.044 in 1998. The capacity of annual production at the mine of Moanda was about three million tons, with reserves evaluated to last 100 years (Encyclopedia of the Nations, 2011).

The Gabonese railway is committed, under the contract, to spend $95 million to boost the line, build new railway stations and engage employees. It has the motivation to do that. The line is single-track, so the manganese ore trains, which account for 25% of revenue, have to share the line with timber. Techniques of increasing the capacity of the line have being debated, as well as the
possibility to add a partial (or full) twin track to the actual line, and at least boosting the existing railway fleet (Sarah, 2007).

The business of the Trans-gabon is a poor profitability: for example the transport of passenger remains well below the capacity of the railway (19 000 tons total weight), even though the opening of two ports Owendo, manganese and timber, has considerably raise its profit. Given the modest amount of traffic and the inadequacy of the structures in tonnage carried, some analysts question whether the investments made to provide a quality transport system is justified so far. Beyond the profitability of Trans-gabon, this mean of transport is relatively quick and efficient regardless of the season.

In terms of technical performance, the transport capacity of trans-gabon is insufficient because of the unavailability of rolling stock. The General Planning Commission, in its study on intermodal transportation plan (1998-2015), mentions that in 1996, among the 34 line locomotives, only 6 are usable and 4 are being used. Of a total of 800 wagons, 300 are reformed and only 300 are actually used. Less than half the logging wagons are operational. Passenger wagons are in poor condition and understaffed. It currently operates with a maximum of 4 trains per day: a logging wagon and a passenger wagon. Comilog also uses a mining wagon per day (Commissariat General au plan et au development, 1999).

The Gabonese principal ports

Gabon has 800 km of coastline on which two principal business activities are managed: Owendo and Port Gentil.

Owendo ports, three terminals: log, minerals and trade

Owendo ports are cramped estuary ports, subject to the phenomenon of siltation. This is a factor inherent in estuarine environments. It penalizes shipping.

The manager of ports and harbors of Gabon (OPRAG) experiences, since 1980, enormous difficulties to ensure at all times, the security of their access to ships of deep draft. Dredging campaigns which are regularly conducted to maintain the rating operating at a satisfactory level substantially encumber its budget. As part of its policy of export promotion, Gabon works increasingly for the development of local processing.

Wood, which is a strategic sector for the Gabonese economy, provides a significant example in this regard. In view of the declining of its oil resources, the state encourages, since 2001, the development of wood processing activities (unwinding, plywood, lumber, slicing). The aim is to add value to exported products. It is also focusing on the promotion and marketing of other species not well known on the international market (Gisèle Makiela-Magambou, 2007).

Port-Gentil first economic center: wood and oil

The port of Port-Gentil benefits from the stability since it is a seaport and offers adequate water conditions to the accommodation of large ships. This gives it a decisive comparative advantage to accommodate ships of deep draft. It could well be, technically, one of the best sites of the CEMAC zone. These strengths should not overshadow the disadvantages which make port expansion difficult. Despite a generally low topography, the most acute problem is the proximity of wetlands and intrusive urban structure. The economy of Port-Gentil is centered on oil and wood exports. However, the lack of real hinterland economy is a hindrance to its growth. The exchanges are mainly by sea and air. This port also encountered logistical problems. If some of them are common problems with Owendo (customs, etc...), others are contrariwise specific to this port (Gisèle Makiela-Magambou, 2007).

The issues encountered by the Gabonese ports

Seaports of CEMAC, particularly Gabonese, do not escape mutations depicted above. They have a vector in a strategic and maritime transportation, now global and multimodal. However, a problem arises: to the ports of Gabon facing the current challenges. This implies, firstly, to deal with the reception of goods in transit and the increase in traffic and, on the other hand, handle flows optimally.

This question is important insofar as the Gabonese ports play a significant role in the national economy. This country is heavily dependent on more than 90% trade transiting Libreville and Port Gentil. However, the ports of Libreville and Port-Gentil do not seem to properly play their transit function. Indeed, many dysfunctions hamper the smooth flow of goods in transit systems. Governments have not been able to achieve new investments that would allow the port tool to be delivered to a level close to international standards and meet the needs of the national economy. In addition to these political and structural obstacles that impede their development, there are the problems of deficits in telecommunications: national coverage is unreliable, high cost of telephone communication, etc. They constitute a handicap for their effectiveness and efficiency.

Therefore, it is very difficult to achieve an end to transport in Gabon. Similarly, a railway connection with the neighboring Congo, which is only 100 km from Franceville, would increase traffic, because on the other side of the border there is a secondary path of Congo railway. Thus, Libreville could be connected to Pointe-Noire and Brazzaville. This would be useful to the extent that
Central Africa is particularly ill-equipped in transport infrastructure. These links would enable ports of Libreville to extend their influence in the Sangha region (northern Congo), closer to the latter than Pointe-Noire (Gisèle Makiela-Magambou, 2007).

This would have the advantage of promoting fair pricing competition between rail and road. As for the economy activity of Port-Gentil, its growth is hampered by a lack of real economic hinterland. Poorly connected to the capital Libreville, and the rest of the country, the hinterland of this town is mostly limited to coastal provinces of Ogooué-Maritime, Moyen-Ogooué and Nyanga. We believe that the outcome of the proposed opening of the city by the construction of the road Libreville/Port Gentil will have the advantage of diversifying and expanding its area of commercial influence.

The situation of Gabon in economics of transport from the sub-region appears as special. This country does not seem to make profit of its opening to the sea, especially since it does not have the vocation of a transit country, despite its geographical position.

All these handicaps suggest that the ports of Gabon are not ready to compete with other ports in the sub region. Table 3 shows the traffic of a few ports of West Africa. In general, the activity of the West African coast is generally modest, when we compare it with those huge organizations in Europe, Asia or North America. At the CEMAC zone, we found that in 1996 the total volume of goods handled at the Port of Douala (PAD) is higher than Owendo-Libreville (4,306 million tons against 3,477 million tons). On the other hand, the performance of Port-Gentil is related to hydrocarbon streams which swell the traffic (Gisèle Makiela-Magambou 2007).

The dynamism of the PAD is due, firstly, to the establishment of a ground logistics platform for the transit of some foreign trade of countries in the CEMAC, particularly those of landlocked countries: Chad and Centrafrique. The branch port facilities to a vast transportation network allow the Cameroon to drain more readily goods to or from neighboring countries. The Cameroon corridor processes nearly 60% of Chad and Centrafrique traffic. This makes Cameroon a transit port for excellence at the sub-region of Central and West Africa.

On the other hand, the authorities of PAD conducted the computerization of all parameters and procedures involved in port operations. The implementation of Port Information System (SIP) allows not only communication between professional maritime services and port operations, but also the processing of information regarding the services provided to ships and cargo (Facilitation and ease of removal of goods at the port, revenue tracking, making fast and automatic invoice). A specific characteristic of the ports of the CEMAC zone, especially Gabon is the absence of sufficient capacity in terms of books that can meet the standardization constraints of traffic. In the case of the commercial port of Owendo, it was designed to accommodate three ships simultaneously. As such, it has three berths measuring 150 meters long respectively (a total length of 455m by 70 m). But the constantly increasing vessel size invalidates the concept of the three initial positions. Table 4 gives a description regarding the characteristics of the main vessels that dock at ports of Owendo. Due to the limited port facilities, vessels over 185 m accommodating in the commercial port of Owendo, whose draft is between 8 m front and 9.40 m behind, are placed at berth No.1, the latter having the ability to accommodate large ships safely. Others hold the berth No.3. As for the berth No.2, it serves to receive the coasters and boats of fishermen due to shallow depths (less than 7 m depth). The oil berth, the berth No. 4, specialized in the loading of light petroleum and gas products. For the export of manganese ore, ore terminal can accommodate ships with a maximum length of 235 m and can load up to 11m draft. Berth 4, with a point of hydrocarbon pumping and developed to prevent the risk of collision especially at night, is especially available to tankers which have berthing priority. Such a distribution of berths is not of a systematic nature. It depends on the traffic and technical characteristics of ships. These observations also apply to the commercial port of Port-Gentil whose capacities to accommodate vessels are identical to those of Libreville (Gisèle Makiela-Magambou, 2007).

At Owendo, shallow draft and insufficient supply of docks are major handicaps to meet the requirements of large vessels. Faced with this penalizing situation the

Table 3. Traffic of some West-African ports in 1996 (in thousands of tons).

<table>
<thead>
<tr>
<th>Cities</th>
<th>Ship</th>
<th>Traffic entered</th>
<th>Traffic out</th>
<th>Total traffic</th>
<th>Liquid bulk</th>
<th>Dry bulk</th>
<th>Diverse</th>
<th>Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douala</td>
<td>1157</td>
<td>2216</td>
<td>2090</td>
<td>4306</td>
<td>602</td>
<td>571</td>
<td>3133</td>
<td>734</td>
</tr>
<tr>
<td>Dakar</td>
<td>2542</td>
<td>3764</td>
<td>2264</td>
<td>6028</td>
<td>2136</td>
<td>1851</td>
<td>2041</td>
<td>720</td>
</tr>
<tr>
<td>Cotonou</td>
<td>1321</td>
<td>1796</td>
<td>424</td>
<td>2220</td>
<td>298</td>
<td>460</td>
<td>1462</td>
<td>614</td>
</tr>
<tr>
<td>Owendo-Libreville</td>
<td>1216</td>
<td>540</td>
<td>2737</td>
<td>3477</td>
<td>198</td>
<td>35</td>
<td>3244</td>
<td>146</td>
</tr>
<tr>
<td>Port-Gentil</td>
<td>1492</td>
<td>178</td>
<td>17540</td>
<td>17719</td>
<td>17087</td>
<td>482</td>
<td>150</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 4. Characteristics of some ships docking at ports of Owendo (January 2005).

<table>
<thead>
<tr>
<th>Type of vessel</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Draught (m)</th>
<th>Occupied berth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinardier</td>
<td>113.6</td>
<td>17.7</td>
<td>8.0</td>
<td>Dock 1</td>
</tr>
<tr>
<td>Oil tanks</td>
<td>103.6</td>
<td>14.8</td>
<td>5.6</td>
<td>Dock 4</td>
</tr>
<tr>
<td>Cargo</td>
<td>137.3</td>
<td>19.5</td>
<td>6.4</td>
<td>Dock 3</td>
</tr>
<tr>
<td>Porte-conteneurs</td>
<td>195.0</td>
<td>32.0</td>
<td>11.0</td>
<td>Dock 1</td>
</tr>
<tr>
<td>Minéralier</td>
<td>190.0</td>
<td>32.3</td>
<td>11.9</td>
<td>Mineral dock</td>
</tr>
<tr>
<td>Ro-ro</td>
<td>196.5</td>
<td>32.2</td>
<td>10.7</td>
<td>Dock 1</td>
</tr>
<tr>
<td>Cargo</td>
<td>201.6</td>
<td>27.8</td>
<td>11.2</td>
<td>Dock 3</td>
</tr>
<tr>
<td>Cargo-grumier</td>
<td>1176.4</td>
<td>30.0</td>
<td>10.5</td>
<td>Wood road stead</td>
</tr>
<tr>
<td>Grumier</td>
<td>154.5</td>
<td>25.0</td>
<td>9.2</td>
<td>Wood road stead</td>
</tr>
<tr>
<td>Navires frigorifiques</td>
<td>134.0</td>
<td>20.2</td>
<td>7.1</td>
<td>Dock 3</td>
</tr>
</tbody>
</table>

Source: the author of this study.

commercial port is not currently able to compete with ports of the sub-region, such as the Cameroonian port of Douala-Bonabéri; as Owendo Douala is also a port of the estuary (Wouri estuary). It counts among its facilities about 20 berth docks (11 berths with 8.5 m) that extend about 3 km along the river.

The different nature of the cargo in maritime transport also implies different organizational methods of handling. In fact, the nature of goods determines the equipment to handle cargo at ports. The loading and unloading of ships require specific port facilities. If the bulk involves systematically dedicated equipment, the two categories of general cargo (containerized and conventional) use two different techniques for their handling.

Staffing of a port depends not only on the volume of goods handled, but also the nature thereof. As such, the treatment of general merchandise requires better organization of handlers work.

The problem of commercial ports of Gabon is that they are poorly equipped in terms of appropriate tools for handling operations. This includes, among others, specialized equipment necessary for efficient handling of units cargo such as portals, centers of stuffing and stripping, carpet, cranes, etc. The absence of lifting dock edge is explained by the fact that ships engage themselves in all handling operations, through their own board gears. In the current context where saving time becomes a factor of competitiveness, Gabonese ports should be equipped with essential handling equipment.

Vessels seek increasingly to shorten their stay to a dock. To fill in the handling services gaps, cargo handling operations are granted to many private stevedoring companies, and one of these enterprises is parastatal, namely the National Society of stevedoring and transit (SNAT), now privatized. This was created to take care of handling in ports when placed in service. As to the OPRAG, it is in charge of the commercial and administrative management of ports (Gisèle, 2007).

Enabling environment

Institutional arrangement

Operations and administration of the transport sector in Gabon are multi-tiered, including government ministry, provincial governments, agencies and private sector companies.

The ministry of transport and commercial shipping rules Gabon’s rail, road, and port sectors. At the local level, these sectors are ruled by Gabonese provincial governments. The Ministry of public works is in charge of management and administration of the road sector (Gabon, 2006).

Road sector policy

Road sector policy in use in Gabon was adopted by the Government 15 years ago. Its main lines are recorded in a document that was developed in an economic recession context. It focused on the progressive disengagement of the state towards productive sector, and commercial services. The transport sector policy has seven goals, namely: (a) organize a transport system capable of meeting the needs of population and productive sectors, (b) support the land use plan and contribute to national economic integration and sub-regional (c) safeguarding the existing infrastructure transport, (d) rationalize investments in the transport sector to reduce their weight in the state budget, (e) reduce transportation costs for users while improving service quality and safety, (f) facilitate the transport of persons and property between major cities, and (g) strengthen the management capacity of institutions and companies.

Road sector policy was first used as a basis for the development of intermodal transport plan (PDIT) mainly devoted to prioritization of sector and subsequent actions;
then the development and launch of which is the road improvement programme framework for donor interventions in the road sub-sector (Banque Africaine de Développement, 2007).

The departments involved in the sector are:

a) Ministry of Public Works, equipment and construction and the Ministry of transport designated as primarily responsible for planning and coordination of transport. In this, they rely on the technical central and regional departments;

b) the Ministry of Economy, Finance, Budget and Privatization in charge essentially of the mobilization and management of resources allocated to carry projects and operations sector. It coordinates the donors panels and assists departments in preparing technical cases of privatization of parastatals;

c) the Ministry of Planning and Development Programming that puts consistency of project proposals and transportation programs with the priorities arising from the national cross-sectoral dialogue.

To these is added the central administrations Road Maintenance Fund (FER 2) of the second generation. Under the dual supervision of the Ministry of Public Works, equipment and construction and the Ministry of Economy, Finance, Budget and Privatization, the PAR 2 involved in the mobilization and management of resources eligible for maintenance funding road (Banque Africaine de Développement, 2007).

Road sector strategy

Gabon has undertaken to accelerate programs to improve the national road network to unleash the economic potential of isolated provinces and increase the volume of trade at the regional level.

In September 2011, the African Development Bank (ADB) has approved 285 million Euros to finance the second phase of the road (PR2) in Gabon. Ultimately, the objective was to provide Gabon with 7,000 km of paved roads between Libreville and southeastern provinces of the country, to improve access to the coastal city of Port Gentil, and develop river transport networks. The Bank has assumed 86.3% of the project cost, while the Gabonese government has paid for the remaining 13.7%, totaling approximately 44.9 million Euros.

The PR2 specifically covers three major road sections. The first, totaling 70 km, connects Mouila, the provincial capital of Ngounié, the city of Ndendé, located further in the south. The segment-Mouila-Ndendé is located on the regional artery linking Cameroon and Congo, and offers to Gabon an easy access to neighboring countries.

The second segment extends 85 km to Ndendé-Tchibanga, capital of the province of Nyanga, situated in the Southwest. This portion of the road will provide access to Mayumba, which will host a deepwater port. In July 2010, the Gabonese government has initiated a project to draw 109 km of paved roads to complete the connection between Tchibanga and Mayumba (Oxford Business Group, 2012).

The third section of road covered by the project PR2 is a paved segment of 36-km long between Port-Gentil and Mandonorvè. This section was part of the east-west linking Port Gentil to Lambarene, and the city of Ndjolé.

Although six of the national highways are paved, only 10% of the approximately 9000 km of roads in the country are paved. This situation complicates the access to inland areas, especially in bad weather. The PR2's aim was to create a vital link with the provinces of the Southwest, which could contribute decisively to the development of agribusiness, mining and tourism. New roads should also reduce 38% of operating costs of vehicles, and shorten the journey time between Libreville and Tchibanga from 13 to 8 hours.

According to the summary of ADB project, work has begun in March 2012 and will be completed in March 2016. The first phase of PR2, initiated in 2007, has enabled the construction of 245.6 km of paved roads between Fougamou and Mouila, and Leyou and Lastoursville, and a ramp between Ndendé and Lebamba.

It is also urgent to improve the urban road networks, especially in cities located inland. The Departments of Public Works and Budget pledged to allocate a total of 75 billion CFA francs (114 million) over three years starting in 2012, to fund road improvements in the regional capitals and county.

Special efforts were also made to improve the road network in Libreville before the African Cup of Nations, the soccer tournament, which began January 21 in Gabon and Equatorial-Guinea. Three new bridges were almost operational before the start of the tournament.

Once the tournament was finished, new access roads leading to the stadium helped to reduce traffic. For example, the access road to the district Nzeng-Ayong, located in the 6th arrondissement of Libreville, in the north of the city, went to two lanes in each direction, which currently greatly benefit the neighborhood.

In addition to road improvements, made under the PR2, work will be made to rehabilitate the banks of the Ogooué River to facilitate river transport. The Ogooué is also a major focus for the transportation of petroleum products, freight and passengers between Port-Gentil and Lambaréné. Ultimately, the PR2 should improve transport on 3300 km of waterways, including rivers and Ogooué Komo and lagoons and Banio Fernan Vaz.

The Gabonese government's determination to build new infrastructure, with the help of development partners, should improve significantly the national transportation system. The opening of access to major cities and production centers in the interior will be critical to achieving the stated objective of the government: diversify the economy in future years (Oxford Business Group, 2012).
Transport industry

Road freight services

Despite the unsatisfactory condition of the network, road transport remains the main mode of transport of goods and people in Gabon. Indeed, almost all products, manufactured goods, general merchandise, one-third of logs and 65% of travelers are transported by road. Also, major parts of the country are connected together by pins road that are structural: the east-west (Franceville-Libreville Ndjolé-along 887 km) north-west (Bitam-Libreville along 486 km) and north-south axis (Libreville-Mouila-Tchibanga along 876 km). It also plays a central role in the multimodal transport system from or to major economic centers of the country (Banque Africaine de Développement, 2007).

Road freight plays a crucial role in facilitating logistics services in Gabon. The structure of the road freight market in Gabonese provinces is considerably fragmented with no one influence market player. In fact, the road transport market considerably consists of owner-operators, defined as company who owns at least one or two trucks. Despite the market fragmentation many of the owner-operators do not belong to truckers' association.

Even thought market competition almost does exist in Gabon's road freight sector, freight services tend to be rather casual and principally operate unregulated.

Generally, road freight service arrangements do not provide for compensating the owner-operator for the driver’s time while queuing to enter the port to drop off a container, no matter how many hours the waiting takes. Many of the road freight companies we interviewed felt they have no choice in the matter and must accept this practice. This practice is an area that Gabonese Government could play a role in.

Regarding road freight tariffs, there are no available road tariff data for Gabonese provinces, so it was difficult to determine diverse road freight tariffs. Road freight operators were not able to say how much they exactly charge customers and the amount charged by each of them for the same destination was different. The only information we were able to determine on road transport tariff was from main shippers who complained about the high cost of road transport. According to the World Bank, in Africa road-freight tariffs still tend to be high compared to others continents (World Bank's 2009 Report).

Railway freight services

The Gabonese railway has a railway network that crosses the country from east to west and links the towns of Franceville, Lastoursville, Ndjolé, and Owendo (Libreville). This line is mainly involved in transport of manganese and log. The freight traffic registered in 2006 (including all products) was about 2.2 million tons. The freight products are mainly composed of manganese (62.2%); logs (30.3%), general merchandise (5.4%), petroleum products (1.2%) and 1% Clinker. The line also includes the transfer of passengers. 200,000 passengers were recorded in 2005.

This network is managed by the SETRAG (former Gabon railway) since 2005. Converted in km of lines, network size is not homogeneous. SETRAG has a network that is less than 1000 km, but compared to some African railway companies, SETRAG has the highest density, that is, 468 km of lines per 1 million inhabitants, as such, it is comparable to the networks density of European countries. This is due to the low Gabonese population (approximately one million inhabitants in 2005).

In 1999, the concession of the Office of the Trans-Gabon Railway (OCTRA) was awarded to a consortium majority-owned by the Société Nationale des Bois du Gabon (SNBG) for 20 years. Without an agreement between the Gabonese government and the concessionaire, the contract was suspended in May 2003. After, the government signed a management contract with the Société d’Exploitation du Transgabonais (SETRAG), a subsidiary of mining company of Ogooué (COMILOG which is a subsidiary of French group Eramet). The contract was renewed regularly. Since August 2005, the Gabonese government signed a concession for 30 years with the COMILOG (Eric, 2010).

Organization of activities

The organization of the transport sector in Gabon is part of government policy, under the authority of the Ministry of Transport which owns the power to define national policy on transport. The integration and development of the Gabonese transportation are then the responsibility of Ministry of Transport that is involved in defining policies, action plans and strategic directions to be implemented.

In Gabonese rail transportation, there are two major activities: freight and passenger transportation. The freight concerns the transportation of heavy products (woods, manganese and others raw material) and is generally performed in wagons. The transport of passengers and their luggage in turn include two main types of activity: traffic called long distance inter-city traffic and mass traffic between the suburbs and the urban center (Eric, 2010).

Equipment

In Table 5, length of the networks operated by SETRAG remained constant, due to the fact that SETRAG company has not developed new networks yet and it is still using the old one built by the former Trans-Gabon. But the company has increased investment in locomotives, wagons in 2008, compared to previous years.
Only cars have not been renewed by the company. This can be explained by the increasing demand for cargo transportation compared to the transport of passengers (Direction générale des statistiques (2010) (Table 6).

### Wagon productivity

Wagon productivity is measured by the ratio between ton-km transported and the number of wagons, reflecting the production sold. To measure the output rail, we can proceed as otherwise by multiplying the weight of cars and their contents by the distance traveled for ton km hauled gross. In Africa, SETRAG is among the companies that hold a higher productivity of the wagons. This performance can be explained not only by the increasing production but also by the fact that its main client (COMILOG) has its own wagons; for example, the productivity of SETRAG wagons of 2214, against 726 for Cameroon. Several data show that SETRAG, as CAMRAIL (Cameroon) has substantially improved the productivity of the wagons. The increasing production and the controlling of the number of wagons used are management factors that have contributed to this performance. The effect of the reform and concession of exploitation that occurred in the 1990s certainly helped in improving these results (Eric, 2010) (Table 7).

### Density of freight traffic

The density of freight traffic is measured by the ratio between the tonnage transported (ton-km) and length of lines (km). In Africa, the highest density is recorded by the SETRAG and Morocco’s ONCF (Table 8).

### Analysis of global factors productivity

The analysis of global factors productivity is a key task for both managers and regulators of the transport sector. Productivity and a high efficiency means an advantage in terms of competitiveness, but these issues remain a relatively unexplored area in Africa, especially in international comparisons.
Table 7. Evolution of the productivity of wagons (in thousands).

<table>
<thead>
<tr>
<th>Companies</th>
<th>Countries</th>
<th>Productivity of wagons</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAMRAIL</td>
<td>Cameroun</td>
<td>726</td>
</tr>
<tr>
<td>GRC</td>
<td>Ghana</td>
<td>367</td>
</tr>
<tr>
<td>NRC</td>
<td>Nigeria</td>
<td>147</td>
</tr>
<tr>
<td>OCBN</td>
<td>Benin - Niger</td>
<td>403</td>
</tr>
<tr>
<td>ONCF</td>
<td>Maroc</td>
<td>755</td>
</tr>
<tr>
<td>SETRAG</td>
<td>Gabon</td>
<td>2214</td>
</tr>
<tr>
<td>SITARAIL</td>
<td>Burkina - C.I.</td>
<td>604</td>
</tr>
<tr>
<td>SNCFT</td>
<td>Tunisie</td>
<td>473</td>
</tr>
<tr>
<td>SNTF</td>
<td>Algerie</td>
<td>194</td>
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</table>


Table 8. Evolution of the cargo traffic density.

<table>
<thead>
<tr>
<th>Années</th>
<th>CAMRAIL</th>
<th>GRC</th>
<th>NRC</th>
<th>OCBN</th>
<th>ONCF</th>
<th>SETRAG</th>
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<td>563</td>
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<td>2005</td>
<td>865</td>
<td>458</td>
<td>65</td>
<td>74</td>
<td>1018</td>
<td>2706</td>
<td>1027</td>
<td>521</td>
<td>147</td>
</tr>
<tr>
<td>Mean</td>
<td>726</td>
<td>367</td>
<td>132</td>
<td>403</td>
<td>754</td>
<td>2214</td>
<td>594</td>
<td>456</td>
<td>199</td>
</tr>
</tbody>
</table>


It is clear from Table 9 that SETRAG is among the companies that experienced managerial productivity gains and increased productivity in technical progress. Ultimately, the overall productivity of SETRAG is about 4.5% (Eric, 2010).

In conclusion, the Gabonese and African railways activity is dominated by rail freight traffic, which represents on average 65% of the traffic unit, against 35% for passenger traffic. The analysis of productivity indices shows that the best productivities are recorded by the SETRAG, Morocco, ONCF and CAMRAIL. These results mean that the market is opening management autonomy and contribute to improving business efficiency.

The analysis of productivity growth shows that the Gabonese and African rail sector achieved a low rate of productivity total factor of about 1% over 11 years. This gain is due to the change in technical progress (6.7%) whose effects are destroyed by changes in managerial efficiency which had a negative growth rate (6.7%) (Eric, 2010).

Rail freight demand forecast

Although its current situation, in ten years, SETRAG will face important challenges in meeting medium-term demand for rail freight services on the rail section between the rest of Gabonese province and Libreville. These challenges will be basically manifested by SETRAG’s capacity to overcome: (a) poor track conditions; (b) insufficient rolling stock and equipment and (c) optimal train operations, scheduling delays, poor rolling stock, and a general lack of hauling capacity to transport freight.

An example of this is the rail service currently available on the Lastoursville-NDjolé-Libreville section of the railway, whereby despite the high demand SETRAG has been unable to provide appropriate rail service on this line due to the poor condition of the track. This has provoked some situations where major local producers either having to buy their own trucks or pay high transport rates for road freight services. It is essential that these sections of the railway network be rehabilitated in order to
Table 9. Evolution of total factor productivity registered by African companies.

<table>
<thead>
<tr>
<th>Companies</th>
<th>Countries</th>
<th>Efficiency change</th>
<th>Technical progress</th>
<th>Total factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAMRAIL</td>
<td>CAMEROUN</td>
<td>0.951</td>
<td>1.072</td>
<td>1.019</td>
</tr>
<tr>
<td>GRC</td>
<td>GHANA</td>
<td>0.873</td>
<td>1.028</td>
<td>0.898</td>
</tr>
<tr>
<td>NRC</td>
<td>NIGERIA</td>
<td>0.886</td>
<td>1.034</td>
<td>0.919</td>
</tr>
<tr>
<td>OCBN</td>
<td>BÉNIN - NIGER</td>
<td>0.800</td>
<td>1.041</td>
<td>0.833</td>
</tr>
<tr>
<td>ONCF</td>
<td>MAROC</td>
<td>1.000</td>
<td>1.103</td>
<td>1.103</td>
</tr>
<tr>
<td>SETRAG</td>
<td>GABON</td>
<td>1.000</td>
<td>1.045</td>
<td>1.045</td>
</tr>
<tr>
<td>SITARAIL</td>
<td>BURKINA-C.I.</td>
<td>1.108</td>
<td>1.076</td>
<td>1.193</td>
</tr>
<tr>
<td>SNCFT</td>
<td>TUNISIE</td>
<td>0.967</td>
<td>1.103</td>
<td>1.067</td>
</tr>
<tr>
<td>SNT</td>
<td>ALGERIE</td>
<td>0.884</td>
<td>1.105</td>
<td>0.976</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>0.937</td>
<td>1.067</td>
<td>1.000</td>
</tr>
</tbody>
</table>


handle the freight (Eric, 2010).

By year 2025 both wood and mineral products will command the largest share of international traffic using the Gabonese corridors. Should the forecasted forest products and mineral freight traffic materialize, it is unlikely that the existing line capacity of SETRAG railway (about 15 million tons) will be appropriate to convey the forecasted freight demand.

Because of the type and volume of cargo (containers and dry bulk) being forecasted, further railway capacity will be necessary. Increasing the transport supply is likely to require two main things: (a) building a new dedicated manganese and wood freight line that can handle higher capacity loads such as longer trains (70 wagons) and larger wagons of 80 net tons and (b) operating primarily units trains of high capacity manganese hoppers and containers trains (Contribution of the author of this study).

**River and sea freight service**

The river and sea transport is operated by several companies from the two seaports (Owendo and Port Gentil) and from at least twenty river ports, all managed by the Office of ports and harbors of Gabon (OPRAG). Indeed, in 2003, the State conceded the management of the ports of Owendo and Port-Gentil to Sigeprag company and also conceded the river transport management to the Inland Navigation Company (CNI), state structure. But these companies not only suffer from the lack of operating equipment and competition from other sector operators (SONAGA, OBOTA, ANTARES) which serve the traffic between Libreville, Port Gentil and Lambaréné. Some of these companies also operate maritime traffic between Gabon and other countries of the West African coast. Large maritime traffic is mainly controlled by large multinationals companies. They provide goods traffic between Gabon and the rest of the world. Besides the freight traffic, some of these ships are also specialized in the transport of passengers, consumer goods and materials (Direction générale des statistiques, 2010).

Although the commercial activities in the last five years in the two ports of Owendo and Port Gentil have a little bit dropped, we can note that these two ports concentrate the most of Gabonese maritime traffic. Both incoming and outgoing products of in these ports are essentially composed of manganese, petrol, timber, construction equipment, agricultural products and consumer goods. These products are transported both in inland cities and in the rest of the world (Direction générale des statistiques, 2010) (Tables, 10, 11, 12, 13)

**Ports of Owendo and Port-Gentil**

The past of Gabonese ports, as the rest of Sub-Saharan Africa, is recent; its infrastructures exhibit the beginning of its participation in the international maritime life. With the development of traffic facilities, once used for handling goods (commercial wharves and jetties) have become obsolete. This failure to adapt to constraints related to international maritime trade requires the upgrading and construction of new infrastructure and adequately equipped. The latter consists of specialized platforms and adapted to the type of goods exported, hence the juxtaposition of activities in the national "port complex". Depending on the nature of the products used, commerce ports generally rub the timber terminals, terminals for diverse products, minerals terminals, fisheries infrastructure. Gabonese polyfunctional ports offer identical docks landscapes, warehouses, embankments, like those of other ports around Sub-Saharan Africa (Gisèle Makiela-Magambou, 2007).

**Port facilities in Gabon**

As we have already mentioned, Libreville includes the
Table 10. Flow of vessels in Owendo and Port-Gentil.

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of incoming vessels</td>
<td>1340</td>
<td>1529</td>
<td>1493</td>
<td>1546</td>
<td>1401</td>
</tr>
<tr>
<td>Number of vessels in out</td>
<td>1340</td>
<td>1529</td>
<td>1493</td>
<td>1546</td>
<td>1401</td>
</tr>
<tr>
<td>Total flows</td>
<td>2680</td>
<td>3058</td>
<td>2986</td>
<td>3092</td>
<td>2802</td>
</tr>
</tbody>
</table>

Source: Direction générale des statistiques (2010).

Table 11. Flow of ships by types.

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container ship</td>
<td>212</td>
<td>334</td>
<td>330</td>
<td>382</td>
<td>414</td>
</tr>
<tr>
<td>Car carriers</td>
<td>24</td>
<td>16</td>
<td>24</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Reefer</td>
<td>24</td>
<td>10</td>
<td>0</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Wine carrier</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Logging carrier</td>
<td>38</td>
<td>58</td>
<td>88</td>
<td>86</td>
<td>102</td>
</tr>
<tr>
<td>Cargos</td>
<td>174</td>
<td>234</td>
<td>212</td>
<td>260</td>
<td>224</td>
</tr>
<tr>
<td>Tankers</td>
<td>222</td>
<td>234</td>
<td>0</td>
<td>36</td>
<td>86</td>
</tr>
<tr>
<td>Logging boats</td>
<td>318</td>
<td>404</td>
<td>420</td>
<td>346</td>
<td>392</td>
</tr>
<tr>
<td>Ore carrier</td>
<td>150</td>
<td>162</td>
<td>162</td>
<td>170</td>
<td>150</td>
</tr>
<tr>
<td>Oil carrier</td>
<td>972</td>
<td>958</td>
<td>986</td>
<td>914</td>
<td>830</td>
</tr>
<tr>
<td>Diverse</td>
<td>536</td>
<td>636</td>
<td>750</td>
<td>862</td>
<td>570</td>
</tr>
<tr>
<td>Total flows</td>
<td>2680</td>
<td>3058</td>
<td>2986</td>
<td>3092</td>
<td>2802</td>
</tr>
</tbody>
</table>

Source: Direction générale des statistiques (2010).

Table 12. Traffic in the ports of Owendo.

<table>
<thead>
<tr>
<th>Port of Owendo</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural products</td>
<td>49377</td>
<td>95963</td>
<td>89650</td>
<td>99635</td>
<td>115407</td>
</tr>
<tr>
<td>Food stuffs</td>
<td>94216</td>
<td>128361</td>
<td>186652</td>
<td>234077</td>
<td>236840</td>
</tr>
<tr>
<td>Local consumer products</td>
<td>25168</td>
<td>35573</td>
<td>51838</td>
<td>71478</td>
<td>81684</td>
</tr>
<tr>
<td>Equipment products</td>
<td>50984</td>
<td>93624</td>
<td>87412</td>
<td>101100</td>
<td>115768</td>
</tr>
<tr>
<td>Energy products</td>
<td>223126</td>
<td>376884</td>
<td>374571</td>
<td>432198</td>
<td>392432</td>
</tr>
<tr>
<td>Building materials</td>
<td>21848</td>
<td>107021</td>
<td>137471</td>
<td>176687</td>
<td>251496</td>
</tr>
<tr>
<td>special transactions</td>
<td>91865</td>
<td>149120</td>
<td>185639</td>
<td>186061</td>
<td>198692</td>
</tr>
<tr>
<td>Outgoing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural and forestry products</td>
<td>7053</td>
<td>25211</td>
<td>23586</td>
<td>25232</td>
<td>28586</td>
</tr>
<tr>
<td>Foods stuffs</td>
<td>3996</td>
<td>7324</td>
<td>5932</td>
<td>1732</td>
<td>4023</td>
</tr>
<tr>
<td>Forestry products</td>
<td>480965</td>
<td>658386</td>
<td>857034</td>
<td>928864</td>
<td>793086</td>
</tr>
<tr>
<td>Local consumer products</td>
<td>2077</td>
<td>2154</td>
<td>3005</td>
<td>2835</td>
<td>3016</td>
</tr>
<tr>
<td>Equipment products</td>
<td>8838</td>
<td>6182</td>
<td>3969</td>
<td>5236</td>
<td>4153</td>
</tr>
<tr>
<td>Energy products</td>
<td>101086</td>
<td>141413</td>
<td>183296</td>
<td>208487</td>
<td>201519</td>
</tr>
<tr>
<td>Building materials</td>
<td>1583491</td>
<td>2899719</td>
<td>2976263</td>
<td>3355302</td>
<td>3268549</td>
</tr>
</tbody>
</table>

Source: Direction générale des statistiques (2010).

The port complex of Owendo with three ports, in addition to the Mole port of Libreville reserved for fishing and coastal shipping. As in Libreville, the port facilities in Port-Gentil also consist of three facilities, in addition to private docks.
Table 13. Traffic in the port of Port-Gentil.

<table>
<thead>
<tr>
<th>Port of Port-Gentil</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming</td>
<td>71461</td>
<td>240001</td>
<td>216990</td>
<td>186605</td>
<td>218659</td>
</tr>
<tr>
<td>agricultural products</td>
<td>9710</td>
<td>2362</td>
<td>22162</td>
<td>16873</td>
<td>2451</td>
</tr>
<tr>
<td>Food stuffs</td>
<td>14702</td>
<td></td>
<td></td>
<td></td>
<td>20533</td>
</tr>
<tr>
<td>Local consumer products</td>
<td>2352</td>
<td>7422</td>
<td>5016</td>
<td>4329</td>
<td>8606</td>
</tr>
<tr>
<td>Equipment products</td>
<td>40870</td>
<td>84524</td>
<td>79479</td>
<td>79523</td>
<td>102789</td>
</tr>
<tr>
<td>Energy products</td>
<td>6657</td>
<td>118579</td>
<td>91112</td>
<td>59912</td>
<td>58958</td>
</tr>
<tr>
<td>Building materials</td>
<td>1451</td>
<td>5022</td>
<td>9674</td>
<td>4060</td>
<td>10631</td>
</tr>
<tr>
<td>special transactions</td>
<td>10421</td>
<td>7391</td>
<td>21546</td>
<td>21909</td>
<td>14690</td>
</tr>
<tr>
<td>Outgoing</td>
<td>4994181</td>
<td>879077</td>
<td>910113</td>
<td>1066818</td>
<td>967277</td>
</tr>
<tr>
<td>Agricultural and Forestry Products</td>
<td>200670</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Foods stuffs</td>
<td>626</td>
<td>2230</td>
<td>4414</td>
<td>492</td>
<td>684</td>
</tr>
<tr>
<td>Forestry Products</td>
<td>353991</td>
<td>357426</td>
<td>391830</td>
<td>342749</td>
<td></td>
</tr>
<tr>
<td>Local consumer products</td>
<td>336</td>
<td>374</td>
<td>1084</td>
<td>492</td>
<td>684</td>
</tr>
<tr>
<td>Equipment products</td>
<td>5328</td>
<td>21692</td>
<td>6192</td>
<td>5778</td>
<td>4914</td>
</tr>
<tr>
<td>Energy products</td>
<td>4743104</td>
<td>425260</td>
<td>462669</td>
<td>589609</td>
<td>545906</td>
</tr>
<tr>
<td>Building materials</td>
<td>27800</td>
<td>37342</td>
<td>43414</td>
<td>46248</td>
<td>47754</td>
</tr>
<tr>
<td>special transactions</td>
<td>16318</td>
<td>38188</td>
<td>34913</td>
<td>31840</td>
<td>24910</td>
</tr>
</tbody>
</table>

Source: Direction générale des statistiques (2010).

owned by various companies such as the oil terminal of Cape Lopez, that belongs to Total-Elf Gabon and the SOGARA (Gabonese refining company) berth; the mole of Elf and UIAE (Industrial Union for Equatorial Africa), the landing stage of the CFG (forestry company of Gabon); the dock of the SNBG (National wood company of Gabon). It is important to note that the adjustments of Owendo and Port-Gentil fit, as colonial port infrastructure in the economic system of extroversion while imports grow. Port activity of Gabon is also organized around the sites of lesser importance: Mayumba Cocobeach.

The latter two shipping centers treat a relatively low level of traffic. Their main activity is limited to the export of logs. Given the conditions of transport and log loading, they have no specialized technical equipment. Mayumba is located in southern Gabon, 375 km south of Cape Lopez. Existing facilities consist of a jetty for tugs and for ferry landing for. Cocobeach is meanwhile in the North west of Gabon. It behaves like Mayumba, a dock for berthing tugs and canoes (Gisèle Makiela-Magambou, 2007).

Evolution of the business of the ports of Owendo and Port-Gentil

By general goods we mean goods that do not require the use of specific port facilities for their unloading / loading. These are conventional cargo, containerized, refrigerated, etc.

If we consider all general goods exported, the volume is increasing steadily. We note some decline between 2000 and 2002. The general trend is relatively slight. We also note a fairly steady increase in imports According to the traffic distribution (landed or shipped) established by the OPRAG we distinguish:

- Container traffic: after a steady growth between 1996 and 2000 to import, when traffic reaches its maximum (256,780 tons), this activity recorded a fallback: 211904 tons in 2002, against 233256 tons in 2001. For export, the traffic is small (less than 50 000 tons) but steadily increasing. This development can be explained by the fact that much of the general imports and exports cargo is carried out by this type of packaging, namely the container. This transport mode makes a significant increase due to the forecast increase of wood processing. We can note that the tonnage reported for containers concern essentially the traffic handled by the containers and road;

- Various traffic, import and export, is evolving saw tooth evolution, punctuated by periods of growth and recession. For imports, for example, the volume of goods handled in 2002 was down (55.339 tons) compared to 2001 which also records regression (83.468 tons) compared to the previous year (103.264 tons in 2000);

- Transshipment traffic: after a period marked by the absence of traffic, the port recorded modest volumes in 2002: less than 1000 tons for import as export. This is explained by the fact that Gabon does not have a vocation as a transit country, despite the presence of a coastline of 800 km long. Its traffic is mainly oriented to the ports of the sub-region, namely Pointe-Noire and Brazzaville in Congo, Bata (GuinéeEquatoriale), Matadi...
Moreover, the structure of the business of the ports of Owendo experiences imbalance between imports and exports. It is the same of that of Port-Gentil. In 2002, the overall volume of goods handled in these ports is about 3567 to 206 tons, down by 0.51% compared to 2001 (3585551). During this same period, the goods landed in these ports correspond to 761.952 tons, against 842130 tons in 2001, a decline in port activity of 9.04%. But at loading, the port traffic recorded an increase of 2805254 tons of goods in 2002 compared to 2001 (2743421 tons), an increase in the volume of port activity of 10.39%.

Two possible reasons can explain the decline in traffic to ports Owendo. First the international environment to which Gabon is no exception. This situation was particularly related to the adverse effects of the decline of the dollar resulting from the Iraq crisis and the terrorist attacks of 11 September 2001 in North America. The weaker dollar slows down the Gabonese economy, thus weakening the resumption of growth that emerged in recent years.

This decrease also reveals the weakness of the operational capacity of the Port of Owendo. As mentioned above, the cramped facilities and poor water constitute a serious handicap to accommodate ships of the new generation. The capacity of the commercial wharf no longer seems sufficient to meet massification of the traffic, size and type of existing vessels.

In the period 2000-2002, the commercial port of Port-Gentil was experiencing significant decline in its business despite the rising of imports from the sub-region. This was related to the persistence of the log crisis and fall in exports of crude oil. Degradation results in a decrease of 23.9% the quantity of logs handled in this port (432,398 tons in 2002 against 568,258 tons in 2001), as well as that of crude oil which rose from 12.27 million tons in 2001 to 11573000 tons in 2002. However, the volume of other goods, amounting to 625,830 tons in 2002 (against 605,198 tons last year), is up 3.4% compared to 2001.

Moreover, the distribution of flows of goods in export transit through Port-Gentil reveals that oil occupies a predominant role in the activity of this port compared to Wood. This reflects its specialization in the export of petroleum products. However, tonnages of logs handled by Port-Gentil had experienced decline since the use of railway service. The railway imputes a significant portion of cargo flows through Ogooué. The reduction of log traffic by river has resulted in continuous traffic regression. It has stabilized at about 150000 tons; parallel to this degradation, traffic at the port of Owendo had raised: it now stands at 700000 tons (Gisèle Makiela-Magambou, 2007).

Cargos handling
The different nature of the cargo in maritime transport also implies organizational methods of different handling. In fact, the nature of goods determines the equipment to handle cargo at ports. The loading and unloading of ships require specific port facilities. If the bulk involves systematically dedicated equipment, the two categories of general cargo (containerized and conventional) in return necessitate different techniques for their handling. General merchandises are goods that have undergone preconditioning before their shipment. In fact, general merchandises involve the use of different techniques and equipment according to their packaging (container or conventional):

- The conventional: the technique of the sling: the crane, associated with the slinging is a loading/unloading instrument of conventional cargo, yet very common in Owendo. The use of it, allows, through the pre-slinging collecting the cargo to embark (or disembark) in loads. This helps to save time for the handling;
- Containers: the technique of the spreader: the gate associated with the spreader is the instrument most commonly used for loading / unloading of container ships. It allows holding the container from the top
- The ferry: gateways and unloading equipment. The ferry is a back loading ship. These accesses are done from the behind of the bridge.

The bulk, liquid or solid, are the goods transported on the ship. Their handling, given their special nature, requires in the port of landing, special equipment for handling as for their storage (silos, tanks, etc.) (Gisèle Makiela-Magambou, 2007).

Flows of ships in the ports of Owendo and Port-Gentil
The study of elements of port traffic reveals significant fluctuations with respect to the movement of vessels in Owendo. Ports recorded an increase of traffic between 1990 and 1993.

The year 1994 was marked by a slowdown of 6.48 compared to the previous year (575 vessels in 1993, against 537 ships in 1994) followed by a rise of flows over the period 1995 to 1998. From that date, the ship traffic is characterized by a slight increase. The number of vessels made the ports increased from 661 in 2001 to 682 vessels in 2002, nearly up to 3%.

Technically, the majority of vessels operating continuously on Gabon and West African coast are multi-purpose types (cargo-timber s) that have the particularity to accommodate several types of cargo. This confirms the specialization of Owendo port on transportation of forest products. They are followed by container ships, tankers and Ro-Ro. Regarding the port of Port-Gentil, it has recorded an increase of cargo traffic of 7.4% in 2002 against 1,888 in 2001 (Gisèle Makiela-Magambou, 2007).
Ocean freight offer between Gabon and the rest of the world

An analysis of ships that connect the coast of Gabon to the world defines the ocean routes. The active corridors converge in a general manner to ports with sustained activity. In the case of the Coast of Africa, there is a domination of the Africa-Europe line for historical reasons. Three European centers dominate the Gabonese maritime market and the sub-region in general. This mainly includes the Naval Delmas / Nedlloy / Lloyd Triestino pole with 19 units, the EAC-Was/Dafra/ Woermann pole with 11 units and the Hoegh / Scadoa / CNS / EA / DSR pole with 12 units, for a total of 42 ships. In contrast, Africa operates only 40 ships belonging to 8 companies. The grouping policy that characterizes shipping today significantly altered the structure of maritime transport supply between Gabon and the rest of the world. To adapt to these changes, ship owners have developed strategies that take into account their traffics and their rotations. Hence, two working patterns can be distinguished in West Africa, particularly in Gabon. Delmas and Maersk are good examples of such strategies, because they are the main actors of African maritime services (Gisèle Makiela-Magambou, 2007).

DISCUSSION

Constraints to supply chain efficiency and transport logistics

Enabling environment

The enabling environment plays a crucial role in corridor development especially regarding facilitation and governance, institutional arrangements, regulatory and legal framework, and indeed, public policy. The role of government, especially the Ministry of Transport, in developing the Owendo and Port-Gentil corridor derives from its public policy directive, Gabonese laws, and priorities of national development. Furthermore, the Ministry of Transport also pursues efforts of regional cooperation with neighboring landlocked countries counterparts as well as with Sub-Saharan regional institutions such as the New Economic Partnership for Africa (NEPA). These institutions provide a platform to address problems related to infrastructure development in support of development and trade, regional development. At the local level in Gabon, the strategic economic plan constitute the document to promote social and economic development in Gabon.

Gabonese corridors development strategy

As shown above many opportunities are available at the local level through bilateral coordination and cooperation with regional institutions to debate policy problems affecting Gabonese corridors. Concurrently, at the provincial level, meetings of governors offer the same engagement. But, it appears that no one Gabonese government institution or agency either at the local level has the responsibility for strategy development for Gabonese corridors, and thus the charge to drive public policy.

Conducting Gabonese corridors development

Although the lack of a significant strategy for corridor development, another important issue is the lack of a pleasant institutional structure with the directive to conduct, manage and promote Owendo and Port-Gentil corridor as logistics corridor. Furthermore, for this reason in an institutional context, the corridor has not benefited despite its domestic and regional significance to extent it should have.

Trade facilitation

Another area in which the enabling environment can improve Owendo and Port-Gentil corridor logistics is trade facilitation. Examining customs documentation and inspecting import and export cargo is a major factor of the logistics chain. This process can contribute to important costs and delays in the movement of containers at the Owendo and Port-Gentil Ports (Gisèle Makiela-Magambou, 2007, Banque Africaine de Développement, 2007).

Road sector

The first constraint to transport logistics in the road sector is the poor condition of the categorized road network infrastructure. The negative effect of these logistics constraints is weaknesses arising from higher truck operating costs for road freight operators, especially during the rainy season.

Poor road surface condition

The road networks in Gabonese corridors are generally in bad conditions. The roads are inappropriately maintained. During a recent survey, the African Development Bank found that almost half of the total road was not in good condition. This situation in turn results in poor operating conditions for trucks, causing regular breakdowns of trucks, and inadequate road safety (Banque Africaine de Développement, 2007).

High transport costs

The condition of the road network in Gabonese corridors
continues to be inadequate and is main constraints to transport logistics in the corridor. Poor quality roads cause inefficiencies from slower speeds, and then, longer travel times, which further augment costs to road freight operators. During the surveys, road freight services firms declared that because of the poor condition of the road network, they generally charge about three times their normal rate. Such cost augmentations are passed on to the consumers and producer in terms of final demand.

Railway sector

The railway sector logistics are constrained by many issues, among which encompass: (a) the physical infrastructure; (b) rolling stock and equipment; and (c) train operations. These constraints result in traffic diversion and low traffic volume.

Physical infrastructure

Poor condition of Gabonese corridors’ railway network, by which important sections of the network such as Franceville, Lastoursville, Ndjolé, and Owendo are restrained rail freight logistics. The poor condition of the track has reduced the speeds of the train to an average of less than 40 kilometers per hour. This has a direct impact on SETRAG railway network capacity and the capacity to provide efficient railway freight logistics services.

Rolling stock equipment

The insufficient rolling stock equipment also restrains SETRAG’s railway capacity to meet the freight traffic demand. The insufficient equipment results in less freight. The current equipment and the rolling stock’s inventory are simply not appropriate to sustain a practicable railway operation.

Line capacity

Line capacity is another medium term constraint. Although line capacity is now affected by the constraints mentioned above, assuming these constraints can be addressed in the next four years; even if the line capacity is be ameliorated it will still be a constraint in the medium term. SETRAG will facely exceed its theoretical line capacity in year 2016, given the future demand (Marcadon, 1996; Eric, 2010).

Ports of Owendo and Port-Gentil

Although the Ports of Owendo and Port-Gentil under the management of OPRAG have shown positive financial results due to increased throughput over the past four years, the ports need to address a number of challenges to sustain their performance. Among these are (a) the high cost of terminal handling chargers; (a) low productivity of container operations; (c) insufficient port equipment; and (d) container dwell times.

Terminal handling charges

Owendo and Port-Gentil ports’ terminal handling charges are very high compared to some Sub-Saharan regions. Indeed, Owendo and Port-Gentil ports’ container handling charges are lower than the more efficient ports in South Africa (Capetown, Durban and Port Elizabeth). What appears to be a driving containers cost at the Owendo and Port-Gentil ports are extra charges such as scanning containers and weighing and finally combined with operational inefficiencies such as extended storage time, container dwell times. Each of these activities minimizes port productivity and enhances logistics costs. Although the terminal handling costs at Owendo and Port-Gentil ports are high relative to other Sub-Saharan regions, we found no evidence that port handling charges at Owendo and Port-Gentil ports had an effect on transport logistics in terms of diverting cargo to other ports. Gabon export goods prices are determined by international market prices, and to the extent that terminal handling charges augments the costs of exports, this effect is most likely reflected in the margins commercial producers receive and not in their decision about either production.

Insufficient port equipment

This is one of major components driving low port productivity at Owendo and Port-Gentil ports. To solve this problem, the Owendo and Port-Gentil ports have taken to relying on ship’s gear to load and off load containers. Furthermore, while the use of ship’s gear might be a direct solution, it is not appropriate to address the operational requirements of a modern port.

Low productivity of container operations

Container moves per hour are a crucial performance indicator of the efficiency of a container terminal’s operations. The maximum the number of moves the more the better the performance. The average number of container moves per hour of 20 ports in sub-Saharan Africa is about 12 containers mover per hour with a standard deviation of 4.6. According to the World Bank, the best-in-class port should perform a rate of 20 moves per hour. Such results are equivalent to the low end of the range of 20 to 25 moves per hours that Asia, North
American, and Western Europe ports generate. By comparison, the Owendo and Port-Gentil ports containers' averages moves is about 8 containers per hour, which is outside of the range of the ports in the World Bank study.

Container dwell times

This is a crucial indicator of a port’s performance because it is related to productivity and throughput. Dwell time refers to a number of days a container stays in the container terminal. Long dwell time minimizes both port throughput and productivity. During the interviews in August 2011 the Owendo and Port-Gentil ports’ customers declared that excessive container dwell time was one of the main issues they experienced in using the port. Numerous customers indicated that the average dwell times in these ports could reach of 30 days for their cargo (Gisèle Makiela-Magambou, 2007; Banque Africaine de Développement, 2007).

Stakeholders (corridors users)

The current transport logistic situation in the Owendo and Port-Gentil ports corridors lures the need for the stakeholders (corridors users) also to play a role in helping to overcome the current challenges the corridors faces. The stakeholders of the Owendo and Port-Gentil ports corridors that encompass freight forwarders, shipping and clearing agents, main shippers have not been properly organized as a stakeholder association to leverage their power to address the logistics pressures to the corridors.

Trade facilitation

This situation also extends to problems such as delays due to inspections of cargo and processing of customs documentation. Stakeholders have not taken benefice of their strengths to address the logistic issues they face everyday. Consequently, this insufficient organization has resulted in stakeholders having to deal with a split supply chain and transport logistics.

Low port productivity

OPRAG has regularly underperformed regarding port productivity in terms of containers handling, especially when measured against its peer group of ports in West Africa which average about 12 moves per crane hour compared to OPRAG’s 8 moves per crane hour. This is generally due to poor port operations, encompassing inadequate port equipment and port infrastructure.

Information management

Managing the flow of information (tracking cargo) is becoming increasing more in demand.

This necessitates an information management systems that are able to track cargo through the whole supply process, preparing customs documentation, paying ocean freight fees, finalizing bills of lading, scheduling shipments, planning containing terminal works few weeks in advance, etc. The uses of cargo and transport logistics related information lack an integrated logistic information management system that could help better manage their logistics requisite (Gisèle Makiela-Magambou, 2007).

SETRAG railway infrastructure Investment program

Concessioned since 2005, SETRAG operates the only railway in Gabon of 640 km long, running through five provinces to link the city of Libreville with that of Franceville. This track is also used by Comilog, for conveying the Moanda’s manganese to the port of Owendo, in Libreville.

SETRAG has recorded satisfactory results in 2006, notably by reaching a record of 238,000 passengers transported and carrying out the computerization of its ticketing service, in order to efficiently manage the customers and minimize the waiting times. The company has transported 681,192 tons of goods in 2011 against 220,498 in the previous year. In 2010, the turnover of the company was 34 billion CFA francs.

More than 250 million CFA francs, is the envelope that SETRAG has planned to invest to supply most of its stations with solar energy. Through this approach, the company intends to preserve the environment because of global warming and comply with international regulations under the protection of nature.

If the stations of Doume, Mbougou-Mbadouma, Moanda, Lastourville, Ayeme and Lopé are already equipped with solar panels, the operation should continue on all stations of the company. Moreover, the next on the list would be the station of Ntoum that will be soon powered by solar energy. This innovation is the opportunity to participate in the construction of “a green Gabon”.

The Board of SETRAG met on October 8, 2011 in Libreville to review efforts made by the company over the last 5 years to improve its capabilities and services. For this purpose the SETRAG said that investments exceeded the financial commitment which it is required by the operating contract with the Gabonese government.

Over the last 5 years the company has indeed invested in maintenance and new equipment for an amount of 58 billion CFA francs, of which 61% spent on track maintenance and 28% rolling stock. On September 30, 2010, 40,000 sleepers were installed and 20 km of track have been replaced, bringing to 210,000 the number of sleepers laid and nearly 100 km length of track replaced.
the orientations of the Central African Consensual Transport Master Plan (PDCT-AC) adopted in December 2003 under the patronage of the Economic Community of Central African States (ECCAS), which attaches special significance to regional infrastructure and seeks, in the short term, to enable traffic on a paved road from one capital to another.

On 12 September 2007, the African Development Bank (ADB) has approved a USD 221.09 million loan to finance RP1, which mainly encompasses: (a) the development of the Fougamou-Mouila (112.4 km), Léyou-Lastoursville (96 km) and Ndendé-Lebamba (37 km) roads; and (b) the conduct of studies on the Mouila-Ndendé-Doussala, Ndendé-Tchibanga, RN1 (PK0-PK12) roads, and the Libreville expressway. To date, all road construction and design contracts under RP1 have been conceded and are being executed. RP2 implementation will help to ensure the continuous flow of traffic on the road sections being paved under RP1. Furthermore, roads under RP2 will contribute to increasing the economic weight of Port-Gentil, Mouila, Ndendé and Tchibanga.

The construction of the Mouila-Doussala (Congo border) road section under RP2 will contribute to strengthening regional integration. In fact, this road section is a crucial link of the Ndjameña-Yaoundé-Brazzaville corridor, which is part of the Tripoli-Windhoek Trans-African highway. The objective of the corridor, which is encompassed in NEPAD’s Short Term Action Plan (STAP), is to connect Yaoundé, Libreville and Brazzaville. Sections of the road between Mbalmayo in Cameroon and Lambaréné in Gabon have already been constructed. The Lambaréné-Fougamou and Fougamou-Mouila sections are being built with financing from the Spanish Government and the African Development Bank (ADB). Through RP2, the Gabonese Government intends to pursue road building work up to Ndendé. Hence, RP2 is consistent with the African Development Bank (ADB)'s Medium-Term Strategy (MTS 2008-2012), which focuses on infrastructure and reaffirms the African Development Bank (ADB)'s leading role in STAP implementation in the areas of infrastructure and regional integration Road (ADB Road Programme-Phase II –RP2, 2011).

Owendo and Port-Gentil ports infrastructure investments

Given the importance of maritime trade corridors for Gabon, a vast array of planned capacity upgrades have been set in motion for the country’s existing ports, while new facilities have been slated for construction in the interior of the country to better cater to increased output from the extractive industries.

Due to increasing activity at Gabon’s ports in recent years, traffic at Owendo, the country’s main port, has risen between 7 and 10% annually since 2009. The port, which currently handles about 6m tons a year of
merchandise, is expecting that figure to grow in the years to come, particularly as the country seeks to increase output in agricultural and industrial sectors.

Because 90% of Gabonese trade passes through maritime transport, it is important to upgrade the ports and the whole infrastructure sector to remain competitive globally. The creation of special economic zones of Nkok and the expected growth in the Gabonese trade balance (the export of containers, such as log, raised by 57% in 2011) provide opportunities to further develop the transport and logistics chain. To help ensure the ports are capable to meet the increasing demand, a number of projects have been launched to help expand capacity and improve efficiency and are moving ahead despite a recent strike.

This has started with the Gabon’s existing facilities, which have been overhauled in recent years. In 2003, the government conceded a 25 year management concession to Portek International, which was recently bought out by Japanese conglomerate Mitsui Group, for both Owendo and Port-Gentil (Oxford Business Group, 2012).

In 2007, the “Société des Terminals de Conteneurs du Gabon”, a consortium between French companies Getma/Necotrans and Bolloré, invested about 12.3 billion CFA (Euro 18.7 4 million) in Owendo to build and manage a new container terminal, which opened in 2009. A further investment of about 40 billion CFA (Euro 60 million) is planned to build a fourth quay at the port by 2013. Overall, the aim is to enhance capacity at Owendo by an estimated 400% by 2015, while boosting the rate at which containers can be filled by up to 75% (Oxford Business Group, 2012).

Announced in March 2012, the two new cranes of the port of Owendo were officially commissioned on April 23. The cost of these equipments was 5 billion CFA francs. It will help to speed the loading and unloading at the ports of Owendo and also to recover the regional traffic shares that escaped in Gabon.

These cranes are 50 meters tall and can lift 100 tons each these latest generation cranes, made in Germany, were acquired by Gabon Port Management (GPM), CO manager of the port with the OPRAG. The new allocation would thus boost the loading and unloading of ships. Thus, from 8 to 10 movements per hour per ship, the Owendo port will rise to 30 or 40 movements per hour per ship, with a gain of 36 hours.

According to Philippe Gery, the General Director of Gabon Port Management, the waiting times was estimated to be almost four days per ship. Hence, the Owendo ports were achieving only eight movements per hour, per ship, on average. With the new cranes, the ports will reach 30 movements per hour, per ship, and hence minimize the waiting time of four days to less than one. Thus these waiting times will be completely eliminated, but also the additional costs incurred by importers and consumers. However, he also declared that the future planned expansion for the Owendo port does face some challenges, encompassing a lack of space to expand warehouse and storage facilities, which will contrict the port’s ability to handle multi-modal logistics activities. Furthermore, Rigobert Ikambouyaty-Ndèka, Co-director, wished that “port operators who take over the supply chain are now required to comply with this level of productivity, by modernizing their equipment and processes.”

This will allow the port infrastructure to quadruple its productivity and, therefore, be much more competitive in the sub-region, although there is still a long way.

In 2010, a budget of 30 billion CFA francs had been used for the expansion works of the infrastructure of this Owendo economic hub.

This work mainly included the extension of the port by 300 meters in order to align with international standards and to provide customers with adequate facilities to allow better flow of ships in port of Owendo. As result, currently, about 300-500 meters have been added by OPRAG, to reach almost 1 km in total and provide enough room for up to four ships at once. This will help in minimizing the waiting times for the traffic of containers at the port.

The Gabonese Government is also currently rehabilitating five docks and upgrading navigation infrastructure along the Ogooué River as part of a transportation project funded by the African Development Bank. River transport along the Ogooué provides a vital link for both people and goods between Port-Gentil and the rest of the country. The project includes funding for a feasibility study for a river port at Lambaréné.

Finally, reliable economic growth and diversification enhanced demand and investment opportunities from construction and maintenance to logistics and freight services, combined with the Gabonese government’s efforts to streamline and encourage private-sector participation will play an important role in ensuring Gabon’s maritime sector enjoy growth in the medium-to-long term (Gabonreview, 2012; Oxford Business Group, 2012).

Conclusion

The objective and purpose of this evaluation were to: (a) carry out studies and build enabling environment strategy plans based on all the findings; and (b) suggest a plan for enhancing investment to ameliorate efficiencies. This part presents the conclusions arising from the evaluation findings above. The conclusions are derived from the examination of the constraints to transport logistics in the Owendo and Port-Gentil ports corridors, as well as from interviews conducted in Gabon from August 10th to August 30th, 2011 with the key stakeholders across the whole supply chain and transport logistics. The different interviews concentrated on all domains of the measurement; encompassing: institutional and jurisdiction
arrangement; the legal and policy, and regulatory framework; the condition and quality of transport infrastructure; the transport industry and supplying of rail and road freight services; transport costs; port operations; trade facilitations and stakeholders (corridor users); merchant-disse production and exports, transport and freight logistics services, and handling and shipping services.

The suggestions introduced below addresses: (a) the enabling environment and reforms that are necessary for public institutions to have a direct role in stimulating corridors efficiency; (b) the infrastructure and functional constraints to the efficient operating of the supply chain and transport logistics efficiency in the Gabonese corridors; (c) the emergency for better stakeholder coordination to address corridors efficiency problems, encompassing logistics costs. But, it is important to note that more detailed studies are required to correctly determine the viability of the suggestions being recommended and, to more accurately define the development costs, and diagnose the financial, economic and commercial advantages to the stakeholders. In developing the suggestions for this evaluation we examined the following components: stakeholder ownership; utility and efficiency of the suggestion to improve Gabonese logistics efficiency; elimination of constraints to efficient transport logistics services; potential for private and public sector collaboration.

Future studies could focus on corridor efficiency monitoring indicators which encompass measurement of cost and time, but which cost and time vary from one corridor to another.

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