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WORLD MARITIME UNIVERSITY
Malmö, Sweden

**THE IMPACT OF DISTANCE AND SERVICE
QUALITY ON PORT SELECTION DECISIONS OF
SHIPPERS FROM WEST AFRICAN LANDLOCKED
COUNTRIES**

By

Eyalon FAWIE
Togo

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE
In
MARITIME AFFAIRS
(PORT MANAGEMENT)

2008

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): *faurdegh*

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Abstract

Title of Dissertation: **The Impact of Distance and Service Quality on Port Selection Decisions of Shippers from West African Landlocked Countries**

Degree: **MSc**

This paper aims at studying the influence of corridor distance and transport quality on the decision of shippers from West African landlocked countries in their port selection. The selection decisions in this paper are considered as a factor impacting positively on port competition.

A look is taken at the maritime transport in the region and its implication, and the level of the competition is assessed following the inductive method of the Industrial Organisation. The influence of distance and road transport quality is assessed using correlation analysis between port market share, distance and road transport quality.

The findings reveal that maritime demand in the region is increasing gradually and port competition is getting fiercer, notably over landlocked countries market. Shippers from these countries have challenges as regards corridor distances. However, the results of the study show that distance is not a self explanatory factor to either individual port's market share or shippers' port selection decision. The quality of roads and transport are the most important factors affecting market share of ports in the region. Shippers are interested in the minimization of their total transit cost. Depending on their interest, they may choose a port which allows offsetting of the gain from the corridor transport quality and the additional port cost or vice versa

The concluding chapter reviews the findings and suggest a number of recommendations related to the promotion of trade.

Keywords: Port competition, selection decision, landlocked countries, Distance, Corridor transport quality, transit cost

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Abbreviations

ACP	African and Caribbean and Pacific States
AfDB	African Development Bank
AHP	Analytic Hierarchy Process
CCs	Coastal Countries
CIS	Commonwealth of Independent States
CPIA	Country Policy and Institution Capacity and Index
CR_n	Relative Index of Concentration
DEA	Data Development Analysis
DPW	Dubai World Port
ECLAC	Economic Commission for Latin America and the Caribbean
EU	European Union
EWATA	Europe West Africa Trade Agreement
FER	Fonds d'Entretien Routier
GATT	General on Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GPHA	Ghana Ports Authority
H	Herfindhal Index
HH	Herdindahl-Hirschman Index
IO	Industrial Organization
IRT	Improved Road Transport Governance
LLCs	Landlocked Countries
LSCI	Liner Shipping Connectivity Index
MD-CCS	Maritime Demand of the Coastal Countries

MD-LLCS	Maritime Demand of Landlocked Countries
MD-SWACS	Maritime Demand of the Studied West African Countries
MPS	Meridian Port Services
OTAL	OT Africa Line
PMAWCA	Port Management Association in West and Central Africa
PPC	Pure and Perfect Competition
RTQI	Road Transport Quality
SE2M	Société d'Entreprises de Manutention Maritime
SETV	Société d'Exploitation du Terminal de Vridi
SWACs	Studied West African Countries
SWAPs	Studied West African Ports
TIR	Customs Convention on the International Transport of goods under Cover of TIR Carnets
TRIE	Transit Routier Inter-Etats
UEMOA	Union Economique et Monétaire Ouest African
US	United States
USAID	United States Agency International Development
WAEMU	West African Economic and Monetary Union

Chapter 1: Introduction

1.1. Background

The world has become a “global village” coined Marshall McLuhan in his book “*The Gutenberg Galaxy: The making of Typographic man*” (1962). This assertion is sustained by the logic of trade according to which the occurrence of the specialization and the difference in the conditions of production are the major driving forces for trade. These differences have led to the introduction of the terms “Comparative advantage” and “Absolute advantage”. Regardless of the term used, companies go where the advantages lie. Therefore, trade creates a demand for maritime transport, which consists of moving goods from one place to another. The port industry in addition to the shipping industry is one of the major players in this transportation process. Ports have undergone great technological and managerial changes due to the event of containerisation as well as the deregulation and liberalisation of this sector.

Privatisation and liberalisation have indeed impacted on the management of ports where increasing importance is being given to the marketing activities, because there has been an imperative need to adjust to the changes. One of those is the so-called inter-port competition. Ports have lost the monopoly over their local hinterland and have to strive to get customers and especially to sustain their development. Customers might be from the immediate or non-immediate hinterland, national or from neighbouring countries or countries located in the same geographical area. Hence, Landlocked Countries (LLCs) are systematically of great interest for ports,

since they have a natural disadvantage as regards maritime transportation when compared to Coastal Countries (CCs).

In West Africa, there is a multitude of small ports in the twelve (12) Coastal States of Benin, Côte d’Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Nigeria, Senegal, Sierra Leone and Togo (See Figure 1-1). Each one has at least one port. Thus, LLCs in the region have multiple alternatives to choose from for the transit of their shipped goods. This situation denotes the fierceness of the competition over this captive market. Ports are, therefore, urged to improve their services in order to increase their demand since LLCs shippers are influenced by different factors when selecting a port.

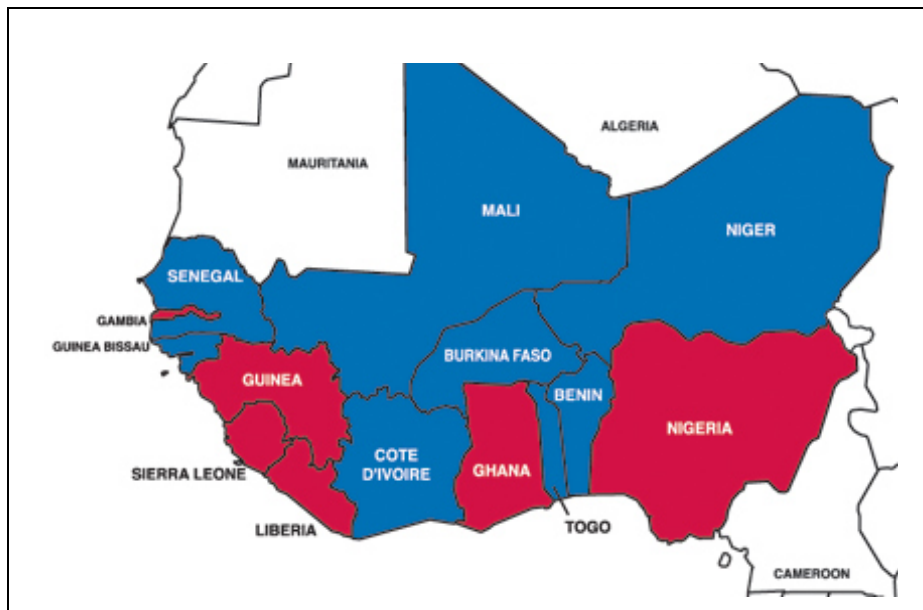


Figure 1-1: Map of the West African region

Source: USAID

1.2. Problem statement

Landlocked countries have a natural disadvantage as compared to CCs. Shippers from these countries are continuously facing challenges as regards the transit of their goods through transit countries which is a condition *sine qua non* for their maritime

transport demand. The case is well observed in West Africa, where LLCs are estimated to pay a higher price for their participation in trade with overseas countries. They are located in a geographical area where the existing ports are engaged in fierce competition. They have different alternatives to choose from for their maritime transport demands. Therefore, they should be capitalising on this opportunity to gain more benefit from the inter-port competition in their region, yet, they are still facing challenges as regards the transit of their goods through CCs corridors. It is a fact that shippers from LLCs incur additional costs (delay, bribes and others) between ports and their location due to the poor transportation network in the region. Inter-port competition in the sub-region is, therefore, impacted by the railway and road transport quality, which are the main means of transport.

This paper aims at investigating the impact of both distance (between LLCs' major cities and ports) and transit corridor conditions on decisions of shippers from LLCs in their port selection in the case of the West African region. Due to the inefficiency of ports in the region, the rivalry between these regional ports is treated as being determined by the road distance and the quality of the road transport, including delay and unofficial costs. This consideration is precipitated by the idea that the considered shippers are rational and aim at minimising their transit cost. Therefore, a port will be chosen by a shipper from a LLC if it allows a lower total transit costs, including the port services-based cost and the inland transportation based-cost.

There are a limited number of studies related to maritime transport in West Africa. Despite the work that has been done by earlier researchers on these regional ports, there have been few attempts to consider a broader number of countries (CCs and LLCs) for the assessment of the competition level in the region. Furthermore, none of the studies investigate the influence of the distance between ports and LLC cities on their transit traffic.

1.3. Objectives

With the understanding of the background provided earlier and the stated problem, this paper aims at reviewing the maritime transport in West Africa after a prior exploration of the concept of port competition and the role of port marketing. The objective is to figure out the intensity of the maritime transport activities in the region and, consequently, port services that are offered to the different customers. The review of maritime demand will also help to better understand the competition in West Africa through a comprehensive assessment. This is an important activity since it will help raise the awareness of the different stakeholders who definitely need to adjust themselves to the competitive environment.

Another objective is to investigate the qualitative factors that might influence LLC shippers' port selection behaviour or decision, notably the effect of distance on their port selection. This is felt to help increase the official awareness of port authorities and countries of the different problems impeding the promotion of port competition.

1.4. Methodology

The competition level here is assessed by the author following the inductive method of Industrial Organisation (IO) and especially through the analysis of the market conditions based on market structure and performance of firms. Information on the regional ports has been gathered from various sources depending on the type of need.

The review of maritime transport in West Africa has been made possible thanks to the different Reviews of Maritime Transport and the world trade statistics published by UNCTAD and the World Bank.

As far as port performances are concerned, the statistical information has been collected directly from port authorities or their websites. However, the collection of information on the different marketing activities conducted by each port has been made possible through phone calls to the port authorities.

Furthermore, the information related to the transit transport facilitation has been collected mainly from various reports and conference papers of the United Nations Conference on Trade and Development (UNCTAD) as well as of the World Bank.

The assessment has been made based on the information gathered from the above mentioned sources following the structuralist method. In this respect, market share and the Herfindahl index have been used to measure the scope of the competition in the region. Moreover, an application of Data Envelopment Analysis (DEA) has been made to highlight how well each port is performing as compared to others considering their inputs and outputs.

In addition, while the influence of distance on LLCs shippers' port selection has been assessed using a correlation analysis, other influential factors have been explored through a synthetic analysis based on relevant sources.

1.5. Limitation of the study

The manifested interest at the beginning of this research was the assessment of port competition between the major ports located in the range Lagos-Nouakchott, with a focus on the ports of Lagos, Cotonou, Lomé, Tema, Abidjan, Dakar and Nouakchott. However, the scope of the study has not been possible due to the unsuccessful collection of statistical data from some ports. The port of Nouakchott, in response to the author's request has provided only limited data. Meanwhile, the different attempts at getting information from the port of Lagos were not successful.

Moreover, the assessment of the influence of distance on particular transit traffic has been made based on the total seaborne traffic. Since, there is an imbalance in the goods imported and exported as well as disparities in their handling; the results could have been more comprehensive if such an assessment had been based separately on the imported and exported goods.

1.6. Thesis plan

Intra-port competition is a real matter in the West African sub-region, especially as regards the LLCs' markets. Numerous factors affect the port selection of shippers from these countries.

To carry out this research activity, it has been felt necessary to give first an overview of the port competition and the role of port marketing. Therefore, chapter two is related to understanding the reason for port competition and what it consists of as well as stressing the role of marketing in ports.

Chapter three provides an understanding of maritime transport in the sub-region in connection with countries trade patterns and their economic health. More importantly, it draws on the relationship between LLCs and CCs. Moreover, it not only gives a holistic view on the process of the development of the research activities, but also presents the summary of the results of the data collection in various tables serving basically as support to the assessment carried out in chapter four.

Chapter four discusses the level of competition in the region through different methods such as market share and the Herfindhal Index. Moreover, it assesses the impact of the distance and the road transport quality in the port selection decisions of shippers from LLCs.

Chapter five presents the results of the assessment made in chapter four, whereas chapter six gives a conclusion of the research as well as recommendations

Chapter 2: Port competition and role of marketing

2.1. Introduction

Economists are concerned with maximising the surplus of both producers and consumers which can only be achieved in a competitive environment; and market structure is one of the basic elements that help in understanding the competition level according to the industrial organisation economists. Moreover, competition, believed to be one of the most important concepts among others as regards to market structure (Wang, 2004, p. 33), is being affected by tremendous changes.

Today, the world market is changing at a vertiginous pace, just like the ports and shipping markets. The latter's market structure, and consequently the competition, have been affected by these changes, which are qualified as being complex. This complexity is explained by the fact that those changes are brought about by other uncertainties which in turn are affected by other changes and so on and so forth. These facts prompted Winkelmanns to predict that competition will continue to rise now and in the future (2003, p. 1). One of the tools for ports to achieve their objectives in this competitive and changing environment is marketing, which has become of great concern and importance in port strategic management (Gabriel, 2000, p. 1).

The essence of the analysis of the market structure is to impact on the formulation and implementation of public policies (Scherer & Ross, 1990, p. 3) while the one of marketing is to help ports in achieving their objectives, especially in a competitive environment. This chapter, first and foremost aims at helping to figure out the main

factors influencing port competition and highlighting the link between port competition and competitiveness. Second, it aims at contributing to shed light on both concepts of competition and marketing related to ports and also to draw the relationship between port marketing and port performance. The objective is to increase the different stakeholders understanding of these notions and to raise their awareness on the necessity to adjust to their new environment.

2.2. Factors influencing port competition

Globalisation of the world's economy has brought about some changes which could be referred to as source of competition. These changes, according to Winkelmanns, range from a company's organisation, education and training and institutional frameworks to the environment (2003, p. 3). This is verified, since there was a need for public and private entities to face the changes in trade, adjust to technological changes, which in turn will enable their full autonomy and responsibility, as well as sustainable development. This scenario has not yet to stop as changes are known to trigger even more changes proving then the reinforcement of competition in the future.

The changes in trade referred to by the previously mention author have been identified by Notteboom in his article called "Container shipping and ports: An overview" (2004). They are mostly concerned with the globalisation phenomenon coupled with the booming of the world's container transport. Similar to Winkelmanns (2003), he acknowledges the need for public and private entities to redefine their organisational framework in order to cope with the new environment. In addition, he points out the immense role played by microeconomic, macroeconomic and policy-oriented factors including, on the one hand, trade facilitation factors through the elimination of trade barriers and the privatisation and deregulation of markets and on the other hand the benefit of economies of scale thanks to the increase in vessel size.

Other identified factors are the changes in ports and shipping markets, including the concentration in shipping and ports due to horizontal and vertical integrations; and also the integration of shipping services to the supply.

Regardless of the type of changes, they all have brought about the so-called “level playing field” and are in the meantime the consequence of the same “level playing field” (Winkelmans, 2003, p. 3). Port competition is a fact and can not be reversible. Hence, a good understanding of the concept itself, and the environment it affects, will help the different stakeholders to adjust and, consequently, to achieve their commercial goals.

2.3. Understanding port competition

2.3.1. Port competition

Port competition bears different definitions depending on the authors. According to Winkelmans (2003) port competition is simply “the action and reaction in the framework of a global market” where ports have to work hard for attracting and maintaining customers (2003, p. 2). However, to Song and Yeo, “Port competition refers to the development and application of differentiated strategic alternatives so as to attract more customers to competitive ports” (2004, p. 35). No matter what the definition of port competition is, it conveys different perceptions depending on the considered angle. One angle is “inter-port competition” and the other one is “intra-port competition.

2.3.2. Inter-port competition

Inter-port competition can be defined as the competition between different ports. The most important element to consider for this definition according to Wang is to “examine whether they serve the same or overlapping hinterland” (2004, p. 34). He goes on to mention how challenging it is to claim competition between the ports of Hong Kong and Singapore since they serve different hinterlands: the first one serves

the traffic flow to and from Northern China while the second one serves the traffic flow to and from Southeast Asia. Moreover, Goss has discovered other indicators determining port competition levels, including port geographical location and the nature of the cargoes that are handled in the port (1990). Hence, three (3) forms of inter-port competition are identified (Wang, 2004, p. 36).

The first one is competition between the whole range of ports or coastlines (East coast and West coast ports in the United States), the second is the competition between ports in different countries such as Hamburg-Le Havre range and finally the competition between individual ports in the same country referring, for instance, to ports in the Northern part of China.

2.3.3. Discussion on inter-port competition

Proponents of competition believe that competition contributes to the maximisation of the surplus of producers and consumers. These conditions are only attainable if the companies or industries involved are increasingly efficient or have developed their competitive edge through the differentiation of their products. Gone are the days when ports enjoyed a monopolistic situation. Today, the era of port privatisation has helped the evolvement of a port market structure in favour of inter-port competition promotion.

2.3.4. Intra-port competition

The World Bank, in Module 6 of Port Reform Toolkit, has made a clear distinction between the types of intra-port competition that could exist within a port (2000, p. 5). It has referred in the first place to the intra-port competition specifically which “refers to a situation where two or more different terminal operators within the same port are vying for the same market”. The second type is called intra-terminal competition and “refers to companies competing to provide the same services within the same terminal” (World-Bank, 2000).

2.3.4.1. Discussion on intra-port competition

De Langen and Pallis stated in their article “Analysis of intra-port competition” that competition is unanimously seen as presenting great benefit for the competitiveness of ports, for local and national economies and for consumers and exporting industries (2005, p. 1). One positive effect of the discussed type of competition will help to prevent “abnormal pricing and rigid operational conditions” as pointed out by Goss and Stevens in their article “*Marginal cost pricing in seaports*” (2001). In addition to preventing monopolistic pricing assimilated to market power, port competition according to Baptista (2000) will lead to a pronounced specialisation, which De Langen and Pallis characterise as the assurance of the introduction of new methods of port services production. However, they argue that a successful introduction of intra-port competition should be made possible only under the condition that the market is at least twice as large as what they call the “Minimum Efficient Scale” (MES) for the provision of port services (2005, p. 9).

Beside the positive effects of intra-port competition there are also some drawbacks. These include the duplication of facilities and the emergence of negative externalities.

The overview of port competition concepts has the objective to emphasise the ports’ awareness of this phenomenon; however, it does not state the kind of behaviour a port should adopt in order to adjust to the new environment and hence, to have what is referred by Winkelmanns as a “catalytic impact” on the changes. In this respect, ports need to have an understanding and an insight on what could be the answers to the question raised by Winkelmanns as regards shippers’ and port users’ choice in consideration of rules and regulations as well as their management capabilities (2003, p. 1). These views are shared by Tongzon who states that this understanding will help port operators and policy makers to have a pro-active management strategy (2002, p. 1).

2.4. Determinants of shippers' port choice

Today, consumers have become more demanding than ever before. Consequently, shippers' behaviour in port selection has evolved over the years. Depending on the size of their businesses, shippers could choose either to have long term contracts with shipping lines, use freight forwarders or simply behave as independent shippers (Tongzon, 2002, p. 2).

What matters most to them is the increase in their turnover and the minimisation of their inventory cost (Haralambides, 2002, p. 327). Since ports are an important node of the logistic chain, it is therefore important for them to help in minimising the shippers' costs. In this regard, many factors have been identified as shippers' port choice determinants, including qualitative factors as well as quantitative factors. The quantitative factors are obviously those that can be measurable and could be categorised in three groups including the route factors, cost factors and service factors (D'Este & Meyrick, 1992, p. 115). Meanwhile, qualitative factors bear a high level of subjectivity and could refer to the flexibility and ease of use, a port's marketing efforts, tradition, personal contacts and the level of cooperation between shipper and port (Tongzon, 2002, p. 3).

Regardless of the nature of influential factors, Tongzon (2002) through a survey, has identified seven shippers' port choice determinant factors. They include high port efficiency, shipping frequency, adequate infrastructure, good location, low port charges, quick response to port users' needs and good reputation for cargo. However, it is to be noted that the most important factor is port efficiency (2002, p. 16). These findings have also been confirmed by Ugboma C. et al (2006) based also on empirical experiences (survey) with shippers using Nigerian ports.

2.5. Determinants of carriers' port selection decision

The understanding of carriers' port selection behaviour is crucial for the formulation of port management policies.

Carriers, as private entities, when calling at ports aim at the maximisation of profit with a full knowledge of the importance of the necessity to satisfy their customers (shippers). Hence, there are quite a number of determinants for shipping lines' or carriers' port selection behaviour. Similarly to those explaining a shipper's port selection, those factors can either be quantifiable or not.

Numerous researchers have identified those factors in a global perspective. Lirn and his co-authors have grouped them in four comprehensive categories including the port physical and technical infrastructure (basic infrastructure condition, technical infrastructure and inter-modal links), port geographical location (proximity to import and export areas, proximity to feeder ports and proximity to main navigation routes), port management and administration (management and administration efficiency, vessel turn-around time and port security/safety and finally carriers' terminal cost (handling cost of containers, storage cost of containers and terminal ownership/exclusive contracts policy) (2004, p. 74).

Tiwari et al simply states in their article "Shippers port and carrier selection behaviour in China: A discrete choice analysis" that all the above identified factors are both service and cost related (2003, p. 36). However, handling costs and basic infrastructure conditions have been confirmed as the most important factors influencing carriers' port selection decisions (Lirn et al., 2004, p. 86).

2.6. Port Marketing, a necessity for ports' development

As has been said earlier, competition has become fierce due to changes in the global market environment. Industries go where advantages lie. The most vital area left for companies to improve their competitive edge is through the chain of production as well as the logistic chain. This depends on how efficiently their Supply Management Chain is functioning. Ports are part of the shippers' and users' supply chain network. One of the common tools used by ports for their development in this intense competitive environment is "marketing"(Bernard, 1995, p. 1) .

2.6.1. Definition of port marketing

Marketing, according to Kotler and his co-authors, is *“a social and managerial process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others”*(2002, p. 5). They go on to clarify that human needs are a “state of felt deprivation” including the needs described by Maslow’s theory of human motivation (physiological needs, safety needs, social needs, esteem needs, self realisation needs) (Dixon, 2003). On the other hand, wants are rather shaped by the culture or individual personality. While wants are unlimited, needs are rather limited. Therefore, faced with a limited purchasing power, there is a need to choose the wants, which have to be satisfied. Thus, wants are converted into demand.

One of the problems facing ports in general is how to efficiently use their capacity, which is often underutilized. Cahoon, in his article “Marketing communications for seaports: a matter of survival and growth”, defines marketing as “a mean of increasing business and revenue and making effective use of underutilized capacity” (2007, p. 151).

There have been few studies related to port marketing and Cahoon brought a significant contribution to this issue when he divided seaport marketing into four groups made up of marketing communications, community liaison, trade and business development and Customer Relationship Management (CRM) (2004). On the other hand, Bernard highlights the tools of marketing described as 3P’s, namely Product, Price and Promotion (1995, p. 1).

2.6.1.1. Nature and characteristics of a service

Ports are considered to be service providers rather than product providers; and there is a difference in the characteristics of services and products. Services are intangible, variable, inseparable, perishable and also lack ownership.

Grönroos refers to the intangible character of a service by a simple description: “A service can not fall on your feet” (1990, p. 130). In other words, it is any activity or benefit that one party can offer to another, which is essentially intangible and does not result in the ownership of anything. They cannot be seen, tasted, felt, heard or smelt before they are bought.

Because service offerings lack tangible characteristics that the buyer can evaluate before purchase, uncertainty is increased. To reduce uncertainty, the buyer can evaluate “signals” of service quality. She may draw conclusions about quality from the place, people, equipment, communication material and price that can be seen.

Services are produced and consumed at the same time and cannot be separated from their providers (inseparable). Their quality may vary greatly depending on who provides them, when and how (variable). Moreover, they cannot be stored for later sale or use (perishable) and they lack ownership.

Regardless of the special characteristics of services in general, and port services in particular, marketing is indeed a tool that helps sales services. In this respect, marketing helps ports to capitalise on their capabilities in order to achieve their commercial objectives. What is the mix of it?

2.6.2. Port marketing mix

The 3P's, as referred to by Bernard (1995), have a great influence on the achievement of ports' goals. Therefore, the identification and application of an adequate combination is of paramount importance.

2.6.2.1. Product

Ports offer services both to ships and to cargo. The former includes the navigational services to ships, whereas the latter includes the handling services to cargo. Four operations are related to cargo handling including ship, transfer, storage and gate

operations. Table 2-1 gives summary of the different port services according to the definition of UNCTAD (1995, p. 27). It is to be noted that while the main two services are independent, the cargo handling operations are inter-linked and inter-dependent.

Table 2-1 : Port facilities and services

Infrastructure	Approach channel, Breakwater, Locks and Berhs
Superstructure	Surfacing, storage (transit sheds, silos, warehouses), workshops offices
Service to Ships	Harbour Master's office (radio, VTS, etc.), navigational aid, pilotage, towage, berthing/unberthing, supplies, waste reception and disposal, security
Service to Cargo	Handing, storage, delivery/reception, cargo processing, security

Source: UNCTAD Secretariat (1995, p. 27)

2.6.2.2. Particularity of port terminal services

According to Lovelock et al. the simultaneous production and consumption of a service is referred to as an interactive consumption (1981). Further, Wiegman pointed out that a service consumer is a “*prosumer*” since he or she is contributing also to the production of the service (2003, p. 130). Both particularly mention that the container terminal has a very special character; it involves four actors taking part in the service production. These include the terminal operator, his/her personnel, the terminal customer, and the terminal-customer personnel (See Figure 2-1). In fact, shipping lines or carriers are considered as buyers of container services and meanwhile, their employees who are in charge of the ships, take part in the service production process.

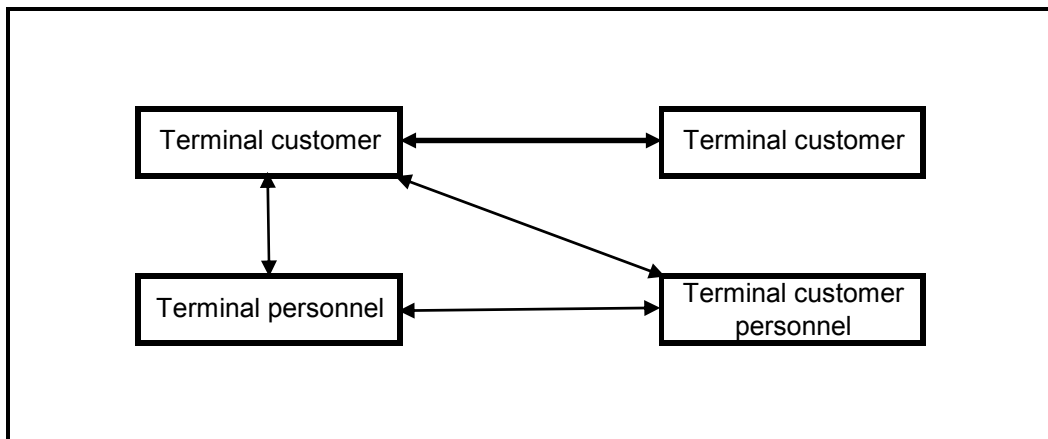


Figure 2-1: Terminal service square

Source: Wiegmans (2003, p. 132)

2.6.2.3. Port price

Even though port competition is a reality, ports operate in a rather oligopolistic situation since many operators, including public and private entities, are involved in producing port services. Hence, port prices are considered as a complex issue. Nevertheless, they are the result of a “strategic pricing” which means “the ability for the producer to influence or set prices in order to achieve certain objectives” (Haralambides, 2002, p. 324). These objectives include the maximization of profit and/or throughput, generation of jobs, minimization of ship turnaround time and promotion of cargo flow.

There are two forms of “strategic pricing” consisting of Marginal Cost Pricing (MCP) and Average Cost Pricing (ACP) (Ramsey, 1927). As a result of strategic pricing, port prices according to Haralambides have to be cost-based and allow cost recovery in the long run (2002, p. 334). However, low and high pricing should be avoided as the first one may lead to an increase of port service demand, port congestion and inefficiency whereas the latter will bring about a decrease in port service demand and, consequently, an excess capacity and its drawbacks (Haralambides, 2002, p. 323).

All in all, port pricing based on a cost recovery process is very complex. While port pricing has not gone beyond academic scope, it is believed that cost recovery has a focus on port users rather than the final consumer (taxpayer) to whom the cost incurred by the port users will be passed on. Moreover, it has been admitted that a “pricing discipline” among port competitors based on policy intervention will be a failure (Haralambides, 2002, p. 341).

2.6.2.4. Port promotion

Cahoon, expressing his view on port promotion, stated that port promotion is an important activity required for an effective relationship between port employees and confirmed and prospective customers and the local community as well (2007, p. 152). Above all, promotion helps not only to increase customers’ awareness as regards the services offered by ports, but also to bring positive changes in their behavior towards the port services that are offered.

The tools suggested by Bernard serve as a guideline for such promotional activities and include advertising, direct mailing, international shipping exhibitions, organizing seaport days, personal selling and direct business, school visits, organizing conferences, being a speaker at conferences , conducting international press days, establishing a seaport education centre and a harbor club for business people working in the seaport (1995, p. 8).

Sales promotion, personal selling and the internet are additional promotion tools recommended for ports to use even though little research has been conducted on such topics. The earlier tool includes workshops and seminars, seaport information (maps and handbooks) merchandizing brochures, seaport tours and trade exhibitions. However, the second tool discussed includes renewal of acquaintances, relationship development and trustworthiness (Peters, 2001, p. 23). The third one is translated to the seaport ownership of an adequate website providing supportive and educational information to users and the general public.

Moreover, due to the complexity of service providers compared to product suppliers, some additional promotional activities are suggested by researchers for service businesses, including word-of-mouth communication and the management of the servicescape and physical evidence (Zeithaml, Berry, & Parasuraman, 1985). While the first communication tool involves two main actors: a confirmed and a potential customer and aims at rendering the service product tangible, the second one has a focus on the environment. Cahoon believes that both tools can contribute to improve the image of a seaport (2007, p. 156).

Today, the new trend in ports as regards the promotion of the port is the establishment of a port community, which includes different stakeholders involved in the port business whether directly or indirectly. Through this medium, they are all called to join efforts in the enhancement of the image of the port for the greater benefit.

Regardless of the communication tool used, ports should make sure that they always assess the results yielded by promotional activities owing to the fact that they contribute to attain, maintain and retain both carriers as well as shippers and to improve the port's image.

2.7. Relationship between marketing and port performance

Marketing has become an important matter to be considered for the strategic management of ports worldwide (Morgan, 1995). Gabriel, in her paper "UK Seaports, Marketing capabilities and Meta Skills", has pointed out that the main reasons for the resurgence of interest in marketing has been the fierce competition in the shipping and port industry that has been underpinned by port liberalization schemes, the technological changes which have impacted positively on ports' efficiency, and the improvement of services thanks to employment deregulation (2000, p. 1). However, the difficulties ports are facing are mainly about finding an efficient way to capitalize on their distinctive capabilities and to adjust to their ever changing environment in

order to achieve competitive advantage (Grant, 1991; Peteraf, 1993). Since the business is changing at a very high and increasing pace, the success of the port management strategy will highly depend on the internal resources and capabilities (Grant, 1995).

Successful ports will put the employees and customers in the center of their business and will, hence, show a great understanding of what Kotler et al. call the service-profit chain (2002). According to them, similarly to other service companies, ports should put emphasis on the five links of the pre-mentioned chain namely internal service quality, satisfied and productive service employees, greater service value, satisfied and loyal customers, healthy service-profits and growth, which will result in a superior service firm performance (See Figure 2-2). Therefore, the improvement of the services requires more than external service marketing where both internal and interactive marketing are included.

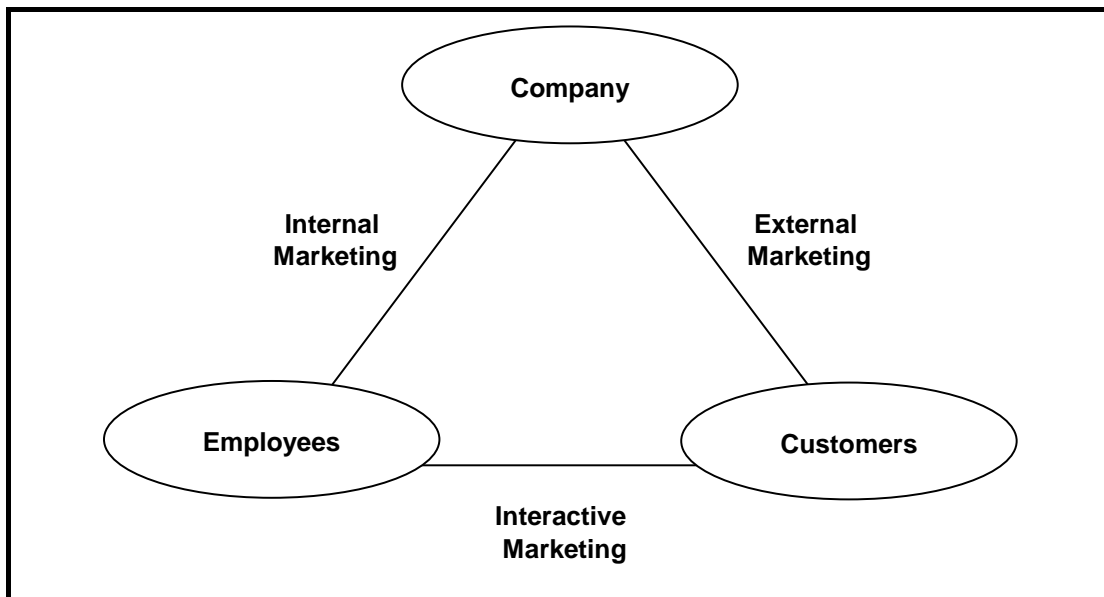


Figure 2-2: Interactive Marketing

Source: Kotler et al. (2002)

Through internal marketing, ports should invest in employee quality and performance by providing effective and motivating good interaction with customers and also by giving all the support to enable their employees to work as a team dedicated to ensuring customer satisfaction. Meanwhile, the practice of interactive marketing rests on the shoulders of the firm through its employees who have to show a good interaction among themselves and the customers.

Chapter 3: Assessment of port competition in West Africa

3.1. Introduction

First of all, this chapter aims at giving an overview on the assessment procedure of port competition as well as the various tools used in this respect. It also aims at following the different suggested steps to assess the competition of port in the West African region.

3.2. Port competition assessment procedure

The best situation for a market to be competitive is to have the characteristics of what is called a Pure and Perfect Competition (PPC). For an effective PPC, a market should satisfy the following conditions: homogeneity of goods and services, profit maximisation, atomicity of actors, perfect information, and free entry/ exit. However, implementation is difficult or rather impossible. This explains the deductive character of micro-economies which had precipitated the rise of the inductive method of Industrial Organisation (IO) for a better assessment of a market competition level. Two schools of thought are related to the IO; Harvard School (Structuralist) and Chicago School (Behaviouralist). While the first school considers that the main element to explain the market conditions is the market structure, the second one believes that it is the conduct of the firms that better explains the market conditions.

Market structure is nothing else than the degree of horizontal integration, vertical integration and differentiation. While, the degree of differentiation is assessed using M. Porter's Diamond Model, the horizontal and vertical integration are measured

using various methods. The relative index of concentration (CR_N), the Herfindahl index (H) and the Herfindahl-Hirshman Index (HHI) will help to define the level of the horizontal integration whereas the vertical integration analyses the governance structures that characterises the relationship between firms (pure market, bilateral contract of hierarchy) (Cariou, 2008a, p. 4). On the other hand, the DEA will help to find, the “best virtual producer” (Wiegmans, 2003, p 101) among the studied regional ports.

3.3. Horizontal integration

The process of market competition, contrarily to the microeconomic approach, focuses first on market characteristics prior to generalisation and is enabled by three suggested tools (market structures, conduct, and performance) and the methods used are as follows.

3.3.1. The relative index of concentration

Market concentration is all about the increase of the size of a unit considering the group it belongs to and can be estimated by different indicators including market share and the CR_N . The latter formula is based on the former and is equally called market share of the n first studied firms and is expressed by the formula (1)

$$CR_N = \sum S_i \quad (1)$$

With, S_i = the market shares. In the case of a monopoly, $CR_N = 1$ and the smaller the indicator, the smaller the concentration. The main drawback of the relative index of concentration is that it does not take into consideration the reduction of the number of companies. Therefore, another tool is used to eliminate such a bias. This consists of the Herfindahl index (H).

3.3.2. Herfindahl index

This indicator gives more importance to the bigger company by squaring the market shares. Hence, the Herfindahl Index is given by the formula (2)

$$H = \sum S_i^2 \quad (2)$$

Depending on the value of the index, the market is characterised as a monopoly ($H = 1$), duopoly ($H = 0.5$), or equality of market share between the n individual studied firms ($H = 1/n$).

Another index derived from the Herfindahl Index is the Herfindahl-Hirschman Index (HHI) given by the formula (3)

$$HHI = H \times 100 \quad (3)$$

With HHI : Herfindahl-Hirschman Index

H : Herfindahl index

The interpretation is different from the previous one. According to the US department of Justice's 1992 Horizontal Guidelines, a market in which the HHI is below 1000 is considered as "un-concentrated, between 1000 and 1800 is "moderately concentrated" and above 1800 is "highly concentrated" (Cariou, 2008a).

3.4. Vertical integration

Defining the vertical integration of the market is all about determining the extent to which a firm controls its upstream suppliers and/or its downstream buyers. This assessment is based on the knowledge that a firm enters into a vertical integration to reduce transportation costs and improve supply chain management, have a control over the main input and to enable investment for highly capital demanding assets. The governance structure, ranging from pure market to hierarchy passing through bilateral contract, characterises quite well this integration. The reason behind is that the governance structure depends on the characteristics of transactions that might take place (See Table 3-1) (Cariou, 2008a, pp. 9, 10)

Table 3-1: Different governance structures

Transaction frequency	Transaction specificity		
	Low	Middle	High
Low	Market	Bilateral contract	Bilateral contract/Hierarchy
Medium	Market	Bilateral contract	Bilateral contract/Hierarchy
High	Market	Bilateral contract	Hierarchy

Source: Derived from Port competition handout (Cariou, 2008a, p. 10)

3.5. Data Envelopment Analysis (DEA)

DEA model is a process that includes a series of linear programming problems that allows measuring the efficiency of a number of producers based on comparison with the “best” producers (Wiegmans, 2003, p 101). The model assumes that the inputs explain the outputs. There are different models of DEA. The main differences between them are their “orientation” (output-orientation, input-orientation) and “return to scale” (constant, variable, increasing, decreasing). However, the use of this model may result in biased results since there are many limitations. For instance, the inputs and outputs are considered as homogenous though they are heterogeneous.

The market analysis using the tools provided earlier starts with the definition of the activity and the concerned firms. In the current case, it concerns ports. The second step consists of the definition of the geographical area with a mention of targeted ports as well as the definition of the market characteristics. The third step gives a clear definition of the variables to be used for the determination of the market share, and Herfindahl index. The fourth step is about collecting relevant data.

3.6. Defining the variables

Generally speaking the main variables to be considered here might be all that is related to port performance. They ultimately include services provided by a port to its users and shippers. Therefore, the most appropriate variable considered is port total traffic (all the different kinds of merchandises which pass through the port). However, for a better knowledge and understanding of the market structure, there is a need for a review of the maritime transport in West Africa and the capabilities of ports in this area based on the facilities they provide.

3.7. Understanding the West African port market characteristics

For the purpose of the study, the LLCs (Burkina-Faso, Mali, Niger) together with the CCs (Benin, Côte d'Ivoire, Ghana, Senegal, and Togo) are referred to as Studied West African Countries (SWACs) and the studied ports are referred to as Studied West African Countries Ports (SWAPs).

3.8. SWAPs and their market geographical location

3.8.1. Ports location

The ports of this paper's focus located in the range Dakar-Cotonou are all Atlantic seaports. The transshipment business is not developed in West Africa and ports in the region are mainly focused on their own hinterland and landlocked countries located in the same area. Nevertheless, the maritime transport is a reflection of the economic performance of the region which has to be reviewed for a better understanding of the market structure.

3.8.2. Hinterland Market

Apart from their local market, ports in West Africa and SWAPs especially serve the hinterland of LLCs. These markets are located in the northern part of the SWACs at the distances summarised in Table 3-2.

Table 3-2: Distance between ports and major cities of LLCs

Countries and selected cities	Distance to selected port (in kilometers)				
	Abidjan <i>Cote d'Ivoire</i>	Cotonou <i>Benin</i>	Dakar <i>Senegal</i>	Lome <i>Togo</i>	Tema <i>Ghana</i>
Burkina-Faso					
• Ouagadougou (captital city)	1176	1015	2401	970	1042
• Bobo Dioulasso (2nd. largest city)	1536	1371	2041	1315	1387
Mali					
• Bamako (captital city)	1184	2036	1431	1873	2012
• Gao (2nd largest city)	2046	1473	2638	1553	1912
Niger					
• Niamey (captital city)	1629	1056	2854	1136	1495
• Alrlit (city of mineral ressources)	2884	2033	4105	2391	2750
Mean distance to the capital cities (in kilometers)					
	1,330	1,369	2,229	1,326	1,516

Source: Derived and adapted from Luguve (2004, p. 21; , 2007, p. 4) and Vissiennon & Alix (2003)

However, their economic performance shown by the GDP is lower than that of developing countries as a whole (UNCTAD Secretariat, 2006a). The overall picture is that the economy of West Africa is reviving, even if it is still lagging behind (Pálsson, Harding, & Raballand, 2007).

3.9. Economic background: Evolution of GDP

A clear relationship between the maritime traffic and the global economy has been identified, which makes it a supply driven demand. Hence, the analysis of the economic background in relation to the Gross Domestic Product (GDP) of countries is one characteristic of the market. The period 2001-2005 has shown an average annual increase of 4.54% in the GDP of the SWACs (See Table 3-3)

Table 3-3: SWACs GDP changes: 2001-2005

Country	GDP Annual changes (%)						
	2001	2002	2003	2004	2005	2001-2005	1995-2004
Benin	5.0	6.4	5.5	2.7	3.9	4.7	5.2
Burkina-Faso	5.7	6.4	8.0	4.8	3.5	5.7	5.3
Cote d'Ivoire	0.0	4.9	0.0	1.7	6.3	2.6	1.5
Ghana	4.2	4.5	5.2	5.2	5.8	5.0	4.4
Mali	12.1	4.3	6.0	4.5	6.4	6.7	5.0
Niger	7.1	3.0	5.3	0.9	4.2	4.1	3.3
Senegal	5.6	1.1	6.3	6.1	5.7	5.0	5.0
Togo	0.2	4.3	2.0	3.8	3.0	2.7	1.6
Average	4.99	4.36	4.79	3.71	4.85	4.54	3.91

Source: UNCTAD secretariat, Maritime Review of Transport 2006, table 46, page 98

3.9.1. Evolution of merchandise trade

By and large, the trend related to the trade of merchandise and the demand of maritime transport in West Africa is similar to the trend in Africa in general.

3.9.2. Imbalance in value of imports and exports

Over the period 2000-2004 the African region has known an average annual increase in both exports and imports trade value of 15.84% and 10.30% respectively (See Table 3-4). During the same period, the SWACs have recorded some positive changes in both the imports and export as well of 11% and 14% respectively (See Appendices A- 3 and A- 4). Furthermore, the trade imbalance existing in this region is worth noting. The import in value is almost double the export of merchandise (See Table 3-5).

Table 3-4: Merchandise trade of Africa: 2000-2004

Year	Billion of \$		% Annual Growth		World share in % for	
	Export	Imports	Exports	Imports	Exports	Imports
2000	148.50	129.10	27.40	0.80	2.40	2.00
2001	137.90	134.00	-7.10	3.80	2.40	2.20
2002	140.10	136.60	1.60	1.90	2.20	2.20
2003	175.10	162.80	25.00	19.20	2.40	2.20
2004	231.70	204.80	32.30	25.80	2.60	2.30
Average	166.66	153.46	15.84	10.30	-	-

Source: UNCTAD secretariat, Maritime Review of Transport 2006, table 48, p 102

Table 3-5: Imbalance in SWACs Import and Export of merchandise in value: 2000-2006

Country	Import/Export of merchandises						
	2000	2001	2002	2003	2004	2005	2006
Benin	1.56	1.67	1.62	1.65	1.57	1.57	1.77
Burkina-Faso	2.92	2.94	2.99	2.88	2.65	3.69	3.30
Cote d'Ivoire	0.72	0.61	0.47	0.56	0.62	0.71	0.63
Ghana	1.78	1.84	1.47	1.38	1.66	2.05	1.48
Mali	1.78	1.37	1.06	1.37	1.40	1.12	1.38
Niger	1.40	1.51	1.68	1.77	1.72	1.61	1.76
Senegal	1.65	1.72	1.84	1.90	1.89	2.08	2.22
Togo	1.55	1.55	1.38	1.30	1.46	1.71	1.78
Average	1.67	1.65	1.56	1.60	1.62	1.82	1.79

Source: Derived from Appendices A-3 and A-4

Even though the trade imbalance in value does not show the imbalance between the goods carried to and from West African ports, this is illustrated in the following section.

3.9.3. Imbalance in goods loaded and unloaded

Table 3-6 shows some discrepancies in terms of goods loaded and unloaded. In fact, the goods unloaded are far lower than the goods loaded of which they represent a portion equal to less than one quarter. The goods unloaded are mostly containerised cargo while those loaded are mainly bulk cargo. According to the UNCTAD secretariat, this imbalance is explained by the fact that the export cargo is to a large extent made up of bulk cargo (oil representing the large portion) and dry bulk (bauxite, and iron ore). General cargo represents a large residual amount.

Table 3-6: African and world seaborne trade (in million tonnes)

Area	Year	Goods loaded (1)	Goods unloaded (2)	Total	(1)/(2)	Changes from 2000
Northern africa	2000	193.9	134.2	328.1	0.7	0.05
	2003	196.6	133.6	330.2	0.7	
	2004	200.6	136.4	337.0	0.7	
	2005	204.0	141.5	345.5	0.7	
West africa	2000	194.7	46.5	241.2	0.2	0.11
	2003	196.4	46.7	243.1	0.2	
	2004	206.7	48.6	255.3	0.2	
	2005	217.5	50.0	267.5	0.2	
Eastern Africa	2000	7.2	24.5	31.7	3.4	0.13
	2003	9.2	26.0	35.2	2.8	
	2004	9.3	26.3	35.6	2.8	
	2005	9.3	26.4	35.7	2.8	
World	2000	5983.2	6273.3	12256.5	1.0	0.16
	2003	6499.7	6597.6	13097.3	1.0	
	2004	6845.5	6893.4	13738.9	1.0	
	2005	7108.8	7122.0	14230.8	1.0	

Source: Maritime Transport Review 2006, annex II

The imbalance between exports and imports explains the level of containerisation in Africa, and particularly in West Africa.

3.9.4. Imbalance in container traffic

African ports are experiencing increases in the container throughput and the growth in this part of the world is even faster than the growth in the whole world. Between 2003 and 2004, this positive change was 16.33% for the African region whereas it was 12.6% for the world (See Table 3-7).

Table 3-7: Container traffic (in million tones) in Africa and its share as compared to the world 2001-2005

Country group	2001	2002	2003	2004	2005	Average change 2003-2004 (%)
Europe	51	57	60	64	69	6.67
Asia	115	134	152	177	199	16.45
North America	30	33	36	38	41	5.56
Africa	-	-	9.66	11.24	-	16.33
Rest of the World	41	42	44	49	52	11.36
Total	244	299	337	357	388	5.88
World annual growth	5.2	9.2	8.2	12.6	10.3	-
Percentage of the world container traffic (%)						
Europe	20.92	19.05	17.81	17.94	17.80	-
Asia	47.17	44.77	45.12	49.62	51.33	-
North America	12.30	11.03	10.69	10.65	10.58	-
Africa	-	-	2.87	3.15	-	-
Rest of the World	16.82	14.03	13.06	13.74	13.41	-
Total	100.00	100.00	100.00	100.00	100.00	-

Source: Conte (2005) derived from *Port and Maritime Transport Challenges in West and Central Africa* and adapted from UNCTAD secretariat, *Maritime Review of Transport 2001 to 2005*

Nevertheless, African ports are still lagging behind as regard to the share of their container throughput as compared to the world. In reality, this share remained modest at about 2.87% and 3.15% in 2003 and 2004 respectively while the growth of the containerisation worldwide for the same period was equal to 8.2 and 12.6 per cent respectively over the same period.

Africa has trade relationships with different countries or groups of countries including Europe, North America, the United States (U.S.), South and Central America and the Commonwealth of Independent States (CIS). However, the tables related to the import origin and export destination of African countries in Appendices A- 1 and A- 2 show a stronger trade partnership with European countries.

Over the period 2004-2006, the import and export from and to Europe accounted for 49.25% and 40.59% respectively. Therefore, the container traffic between Africa and Europe illustrates very well the level of containerization traffic and its imbalance in Africa as summarized in Table 3-8.

**Table 3-8: Container traffic between the West Coast of Africa and Europe
(In thousands of TEUs): 2000-2005**

Year	Real		forecasted	
	Southbound flow	Northbound flow	Southbound flow	Northbound flow
2000	465	253	465	253
2001	447	267	447	267
2002	-	-	440	267
2003	534	278	437	270
2004	532	281	439	273
2005	556	286	446	277

Source: Derived from UNCTAD secretariat, Maritime Review of Maritime Transport 2003, P114, table 56 and adapted from Maritime Review of Transport 2006, table 54, p114

3.10. Collecting Data

The total traffic of ports expressed in tonnage has been collected from various sources including the port Authorities and their Websites. The unavailability of either a port website or the required data on these websites, or the unwillingness of some ports of the region to provide their statistical information, has resulted in the

restriction of the current study to the pre-mentioned ports called SWAPs. The data collected purposely included different items such as the transit traffic, national traffic and transshipment traffic. In fact, the role of ports in the region is not only limited to the national level but also to the LLCs, which are considered to be a captive market. The reason for these distinctions is to have a clear view of the competition level in each one of these traffic segments.

In addition, focus has been given to the container throughput because of the particularity of that business and its breakthrough in the port business. The objective is to give a picture of the business in the region and increase awareness for further improvement.

Port traffic is considered to be the output of various inputs. Indeed, there are several views as regards to port outputs. For instance, Chang (1978) quoted by Wang stressed that port output could be estimated either in total tonnage generated by a port or in its gross profit (2004, p. 161) while the input should be made up of the value of the net assets of the port, the number of labourers per year and, the average number of employees each month per year; also including the technological developments. On the other hand, Cullinane and Song (2002), as cited by Wang, view labour and capital as being the determinants of a terminal output (2004, p. 163).

Based on the evidence that port output is regarded as the combination of different inputs, it has been felt there was a need for collection of quantifiable available information such as port facilities and equipment as inputs to be considered. The objective is to eliminate, as much as possible, bias analysis on port output or productivity assessment. The means for the collection of such information are similar to the ones used for the collection of port traffic data.

Furthermore, it has been felt important to also collect information on the privatisation process in the ports of the SWAC since this phenomenon is seen to be a very good

enabler of port competition, both at the inter and intra level. In addition, information on the main stakeholders of the shipping business including terminal operators and carriers has been gathered for further analysis.

All the above collected information will be used for both the assessment of the port competition in the region and the analysis of the influence of distance on LLCs shippers' port selection decision.

3.11. Ports throughput

The West African region is characterized by a multitude of small ports. The fact is that more than 12 ports are serving the region and moreover not one of them is among the ports ranked in the top 70 in the world (Pálsson et al., 2007, p. 11). They are not only concerned with their national traffic but are also involved in the transshipment business and the transit traffic destined for the LLCs. Appendices, B- 1 to B- 7, show the annual traffic of each port over the period 2000-2006.

3.12. Ports infrastructure and superstructures

Traditionally, only geared vessels call at West African ports, since these ports do not have the appropriate equipment to efficiently handle the vessels. However, with the advent of the concession of terminals, big efforts have been and continue to be made to equip these ports with appropriate facilities that will contribute to the improvement of port efficiency.

Côte d'Ivoire acquired its first two gantry cranes in 1986 to enable Vridi Container terminal to accommodate gearless vessels. The third one was bought in 1999 and the fourth is to be delivered by the end of 2008 (Louko, 2008). Côte d'Ivoire has been followed by Ghana in taking this step. Tema port is the owner of three gantry cranes since 2005 and is waiting for the fourth one at the end of 2009 (Gbeyi-Donko, 2007).

Meanwhile, with the award of the concession of the “Terminal du Future” in Dakar by Dubai Ports World (DPW) since 2007, there are great expectations for the improvement of this container terminal. However, at present, this port possesses three mobile cranes which are used instead of ship-to-shore cranes. The DPW projects to increase the amount of port equipment by the end of 2008 with two ship-to-shore cranes and two others by the end of 2009 after an upgrade of the container terminal. According to this operator’s authorities, Dakar port with the projected facilities will be able to accommodate third generation ships (Badji, 2008; Service Statistiques, 2008).

The purchase of two mobile cranes in 2006 (inaugurated at the end of 2006) for the use of Lomé port is one of the achievements of the joint venture Group Progosa and CMA-CGM (PROGOSA). However, Benin has also acquired two mobile cranes which were inaugurated on 20 June 2007, one year after the acquisition of mobile cranes by Lomé port (Ganssou, 2007).

In line with the growth of container throughput in the world, containerisation in Africa is increasing as well. The corresponding rate of change experienced by African ports is even higher than the world pace itself. In 2004, the related increase was 16.33% for Africa while it was 12.6% for the whole world (See Table 3-7). Nevertheless, container traffic remains slow in West Africa compared to the rest of the world.

As has been mentioned earlier, carriers are interested in short transit time and low port costs. Therefore, adequate facilities have to be put in place to satisfy these conditions. However, ports in Africa, and especially those of West Africa, seem not to respond adequately to these challenges. Some of the quantifiable infrastructures and superstructures are summarised in Tables 3-9 and 3-11 which give an overview of ports’ facilities and their capabilities.

Table 3-9: Some West African port facilities: situation in 2008

Ports	Bassin (ha)	Draft (m)	Berths (nb)	Port quay length (m)	CT quay Length (m)	Cov&open Area (sm)	Container Yard (sm)	Gantry cranes (nb)	Mobile cranes (nb)
Abidjan <i>Cote d'Ivoire</i>	1000	15	40	2920	960	554800	320000	3	0
Apapa <i>Nigeria</i>	NA	9	6	4059	1005	NA	446400	4	0
Banjul <i>Gambia</i>	NA	8	4	750	200	49938	23338	0	0
Cotonou <i>Benin</i>	60	10	12	1200	420	270000	170000	0	2
Dakar <i>Senegal</i>	87	11	40	4060	484	232097	360000	0	3
Lome <i>Togo</i>	81	14	8	1077	390	136000	125000	0	2
Nouakchott <i>Mauritania</i>	NA	10	3	730	200	80000	78000	0	*3
Tema <i>Ghana</i>	166	11.5	12	2013	575	390000	255000	3	0

Source: Compiled by the author from different sources

*3: The cranes in Nouakchott port (PANPA) are rather fixed as compared to others

Table 3-10: statistical summary based on Table 3-9

	Bassin (ha)	Draft (m)	Berths (nb)	Port quay length (m)	CT quay Length (m)	Cov&open Area (sm)	Container Yard (sm)	Gantry cranes (nb)	Mobile cranes (nb)
Mean	278.8	11.0625	15.625	2101.13	529.25	244690.7	222217	1.25	1.25
Standard Error	181.1959	0.8475	5.4443	498.4829	108.9038	68129.26	52168.61	0.6196	0.4910
Median	87	10.5	10	1606.5	452	232097	212500	0	1
Standard Dev.	405.1663	2.3970	15.3989	1409.92	308.026	180253.1	147555	1.7525	1.3887
Kurtosis	4.7963	-0.5018	-0.2537	-1.5602	-0.7225	-0.0917	-1.2312	-1.6961	-2.2123
Skewness	2.1826	0.6443	1.2494	0.5926	0.7314	0.7875	0.1735	0.7696	0.2667
Range	940	7	37	3330	805	504862	423062	4	3
Minimum	60	8	3	730	200	49938	23338	0	0
Maximum	1000	15	40	4060	1005	554800	446400	4	3
Sum	1394	88.5	125	16809	4234	1712835	1777738	10	10
Count	5	8	8	8	8	7	8	8	8

Source: Yielded from Table 3- 9

Table 3-11: Summary of West African ports' equipments: situation in July 2008 and projections till 2010

Ports	Equipment acquisition per year					Projection		Up to date Total	Project- date ed Total 2010
	1986	1999	2005	2006	2007	End 2008	End 2009		
Gantry cranes									
Abidjan	2	1	-	-	-	1	-	3	4
Tema	-	-	3	-	-	-	1	3	4
Dakar	-	-	-	-	-	2	2	-	4
Mobile cranes									
Cotonou	-	-	-	-	2	2	-	2	-
Dakar	NA	NA	NA	NA	NA	3	-	3	-
Lome	-	-	-	2		2	-	2	-

Source: Compiled by the author from various sources

Substantial port equipment acquisition and infrastructure extension in West African ports have taken place in the era of privatization which has been undergoing since the early years of the 21st century.

3.13. Port privatization

The globalisation phenomenon has also constrained West African ports towards the privatisation (See Table 3-12). They have either introduced port reform in line with the Francophone or the Anglophone models described by the UNCTAD Secretariat giving, therefore, way to Private Public Partnerships (PPP) (2003, p. 7).

However, it is to be highlighted that until 2000 most of West African ports were still under the control of the government that used to be fully in charge of the handling activities. This confirms Drewry's studies, which are summarised in Table 3-13.

Table 3-12: SWACs major ports privatization

Country	Port	Signature contract convention	Date	Type of contract	Period (years)	Projects
Benin	Cotonou	-	-	-	-	Construction of a new container terminal
Cote d'Ivoire	Abidjan	Oct-01	Aug-03	Concession	15	Construction of a container terminal and an industrial zone
Senegal	Dakar	Oct-07	Jan-08	Concession	25	Expansion of the existing container terminal & construction of a specialised bulk port
Togo	Lome	Aug-01	Jan-02	Concession	10	Construction of a new container terminal
Ghana	Tema	-	Mar-07	Concession	20	-

Source: compiled by the author from various sources

Table 3-13: World container terminal port handling by ownership in 2005 (in percentage of total throughput)

Area	Global operators and private operators	State operators
Africa	16.1	83.9
World	79.1	20.9

Source: (Drewry, 2005, p. 7) derived from *Port and Maritime Transport Challenges in West and Central Africa: SSATP* (Page 12)

3.14. Major terminal operators in the region

The emergence of private terminal operators in West Africa dates back to the early 21st century. The set up of the companies are Private-Public Partnerships, regardless

of whether it is a general cargo or a container terminal. The major container terminal players are Bolloré, CMA-CGM and Maersk. In addition to Maersk, Progosa and Dubai Ports World have succeeded as outsiders in penetrating the West African market in the nineties, 2001 and 2007 respectively.

While the container terminal in Tema is operated by “Meridian Port Services” (MPS) a consortium consisting of “Ghana Ports And Harbour Authority” (GPHA), Maersk and Bollore (Gbeyi-Donko, 2007), the one in Abidjan is handled by “Société d’Exploitation du Terminal de Vridi”(SETV) made up of Bollore (60%) and Maersk (40%), whereas in Cotonou, Maersk and Bollore are competing in the same terminal. However in Lomé, the terminal is managed by Société d’ Entreprises de Manutention Maritime (SE2M) consisting of a partnership between Progosa and CMA-CGM (PMAWCA, 2005) (See Table 3-14). Dubai Ports World on the other hand has conquered Dakar Port since the beginning of the year 2008 when its activities has officially started.

Table 3-14: Container terminal operators in West Africa: situation in 2008

Port	Container Terminal operators		
	Company	Joint venture	Partnership
Abidjan	SETV	•Bollore •Maersk	
Dakar	GMO	•Dubai Port	
Tema	MPS	•Maersk •Bollore •GPHA	Public-Private
Lome	SE2M	•Progosa •CMA-CGM	
*Cotonou	•SMTC •COMAN •SOBEMAP	•Bollore •Maersk •PAC	

Source: compiled by the author from different sources

**Cotonou*: SMTC, COMAN, SOBEMAP are instead 3 separate companies operating the terminal.

Besides the terminal operators, another type of stakeholder is the carrier or shipping line. Manifestly, they are ensuring the connection between the region and other parts of the world and play a role in the development of trade in the region.

3.15. Shipping lines in West Africa

As a result of lack of traffic volumes, poor efficiency and inappropriate or insufficient infrastructures, few shipping lines call at West African ports as compared to other regions (Pálsson et al., 2007). Table 3-15 shows the evolution of the number of shipping lines over the period 2000-2007

Table 3-15: Number of shipping lines serving West African ports: 2000-2007

Trade Routes	2000	2001	2002	2003	2004	2005	2006	2007	Change 2000-2007 (%)
West Africa-Australia	1	1	-	-	-	-	-	-	-
West Africa-Europe	39	37	30	30	37	33	31	29	-25.6
West Africa-Far East	6	8	9	9	10	8	8	10	66.7
West Africa-Indian Ocean	3	2	4	5	4	4	5	2	-33.3
West Africa-Mediterranean	19	24	24	17	14	13	12	12	-36.8
West-Africa-Nth America East Coast	8	5	2	2	2	4	4	5	-37.5
West-Africa-Nth America Gulf Coast	8	6	4	5	5	4	4	3	-62.5
West Afrca-St Lawrence Seaway	1	1	1	1	-	-	-	-	-
West Africa-Nth America West Coast	-	-	-	-	-	1	1	1	-
West Africa-Sth America East Coast	4	3	2	2	11	14	16	15	275.0
West Africa-Sth America West Coast	-	-	-	-	-	-	-	15	-
Total number of shipping lines	89	87	76	71	83	81	81	92	3.4

Source: Compiled by the author from Containerisation International (various years)

3.16. Port accessibility in West Africa

The Liner Shipping Connectivity Index (LSCI) developed by UNCTAD in 2004 and upgraded in 2006 gives an overall picture of the container traffic in the World. LSCI also gives an idea of how regular and frequent shipping activities are. Owing to the positive impact of this regularity and frequency for economic activity in a country,

the LSCI is considered to be an important tool for measuring how competitive nations are. According to the UNCTAD Secretariat, LSCI quantifies countries' competitiveness. It is "built up by taking nine elements into consideration"(UNCTAD Secretariat, 2006b). These elements include the number of containerships, container carrying capacity deployed, the per capita number of containers shipped, the per capita container carrying capacity, the number of liner shipping companies servicing a country's ports, the maximum size of vessels deployed, the average size of vessels deployed and the average number of vessels operated per liner shipping company.

Table 3-16 gives a ranking of West African ports as to their likelihood to be preferred by shipping lines, if we assume the frequency and regularity of shipping services in a country as the preference of shipping lines for a particular country.

Table 3-16: West African countries' connectivity to shipping Liner Shipping based on LSCI: 2004-2006

Rank	Region	Country	2006	2005	2004
16	Non West Africa	<i>Egypt</i>	50	49.2	42.9
31		<i>South Africa</i>	26.2	25.8	23.1
59		Ghana	13.8	12.6	12.5
60		Nigeria	13.0	12.8	12.8
61		Cote d'ivoire	13.0	14.5	14.4
67		Senegal	11.2	10.1	10.1
69		Togo	11.1	10.6	10.2
71	West Africa	Benin	11.0	13.9	13.9
102		Mauritania	6.2	6.0	5.4
111		Sierra Leone	5.1	6.5	5.8
114		Guinea-Bissau	5.0	5.2	2.1
116		Gambia	4.8	6.1	4.9
121		Liberia	4.5	6.0	5.3

Source: UNCTAD Transport Newsletter 34 (2006)

3.17. SWACs Ports' facilities and equipment

Based on the facilities they offer (See Tables 3-9 and 3-11), it appears clearly that West African ports are not able to accommodate larger vessels and hence are unable to offer the benefit of economies of scale to shipping lines.

Although there has been an increase in the number of vessel calls in this part of the world (15000 in the early 1990s to more than 20000 in the early 2000s), the size of the vessels is not increasing. The size of vessel calling at these ports is not above 2500 TEUs and mostly ranges between 1000 and 2000 TEUs. This has indeed an impact on the number of shipping lines serving the region compared to other regions.

Chapter 4: Results of the assessment of port competition

4.1. Introduction

This chapter presents the results of the assessment of port competition in West Africa especially in the SWACs. These results concern different angles and consequently have been based on different methods using the data or information summarised in the different tables of the previous chapter.

4.2. Maritime demand in West Africa

4.2.1. Maritime demand and GDP

The hypothesis to be tested here is that SWACs maritime transport demand growth is faster than the growth in their economies.

Maritime transport is a driven demand and it is well acknowledged that the developments in world economy and trade have a direct effect on the maritime demand (Ma, 2007, p. 19). Moreover, there is a clear link between trade development and the world economic health. The former grows generally more quickly than the latter. This fact is illustrated in West Africa as well.

The method used is the GDP elasticity of maritime port traffic demand which gives an idea about what could be the changes in a particular port traffic demand depending on the changes in the GDP of the considered group of countries (See Table 4-1). This table is derived from Table 3-3 p.28 related to the GDP and the tables related to the SWAPs' traffic (See Appendices B- 7 and B- 9).

Table 4-1: GDP elasticity of the demand of port services: 2001-2005

Type of Changes	2001	2002	2003	2004	2005	2001-2005
GDP	4.99	4.36	4.79	3.71	4.85	4.54
TEUs	19.03	12.90	17.04	11.20	5.95	13.22
MD-SWACs	9.66	3.48	7.38	8.57	7.35	7.29
GDPCCs	3.00	4.24	3.80	3.90	4.94	3.98
MD-CCs	4.77	2.04	5.37	8.97	7.74	5.78
GDPLLCs	8.30	4.57	6.43	3.40	4.70	5.48
MD-LLCs	9.23	33.17	18.98	-9.99	20.58	14.39
Demand	GDP elasticity of the demand of maritime transport					
TEUs	3.81	2.96	3.56	3.02	1.23	2.91
MD-SWACs	1.94	0.80	1.54	2.31	1.52	1.61
MD-CCs	1.59	0.48	1.41	2.30	1.57	1.45
MD-LLCs	1.11	7.26	2.95	-2.94	4.38	2.63

The analysis of these tables shows that the economic health of West African countries is reviving although it still remains below that recorded by developing economies as a whole. The economic performance of the countries of this paper's focus has known an average change of 4.54% over the period 2001-2005. It is worth noting that the growth in LLCs (5.48%) is faster than that of the CCs (3.98%)

The demand for containers has increased by 13.22% over the period 2001-2005. Meanwhile, the port traffic generated from the national markets has also realised a positive growth of 5.78% whereas the traffic generated by LLCs has increased by 14.39% over the same period of time.

The demand for containers in West Africa is GDP elastic (See Table 4-1). An increase in the GDP of 1% has led to an increase of 2.91% in the demand of containers. This result is closer to the findings of Penfold (2005) presented by

Pálsson et al according to which, containerisation in the region has grown more than three times compared to economic growth (2007, p. 10).

The Maritime Demand of SWACs (MD-SWACs), the Maritime Demand of CCs (MD-CCs) and the Maritime demand of LLCs (MD-LLCs) have increased respectively by 1.61%; 1.45% and 2.63% for an increase of 1% in the corresponding GDP (See Table 4-1 and Figures 4-1, 4-2 and 4-3).

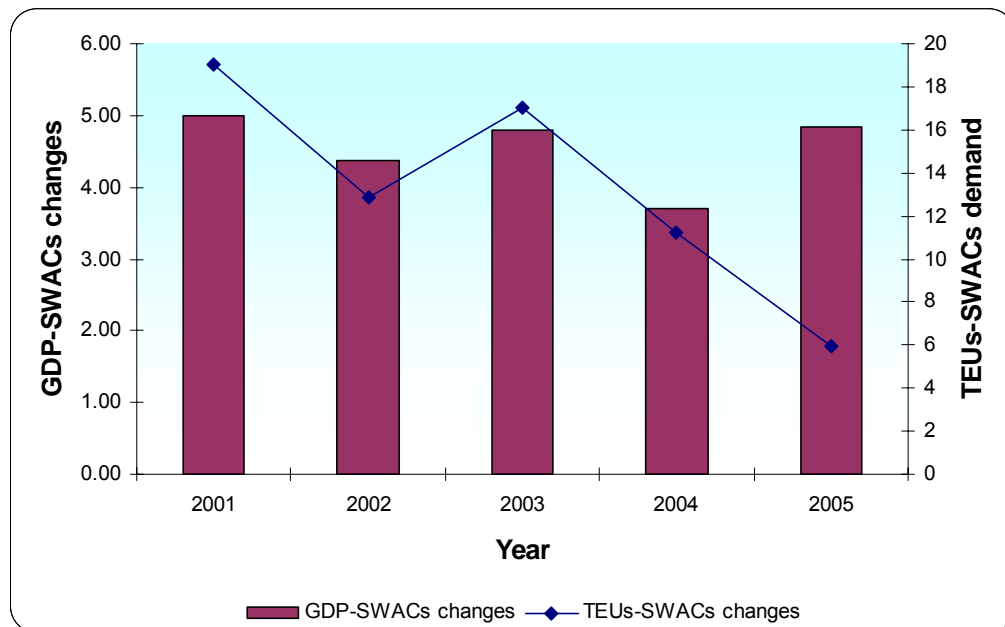


Figure 4-1: Changes in GDP and TEUs demand of SWACs: 2001-2005

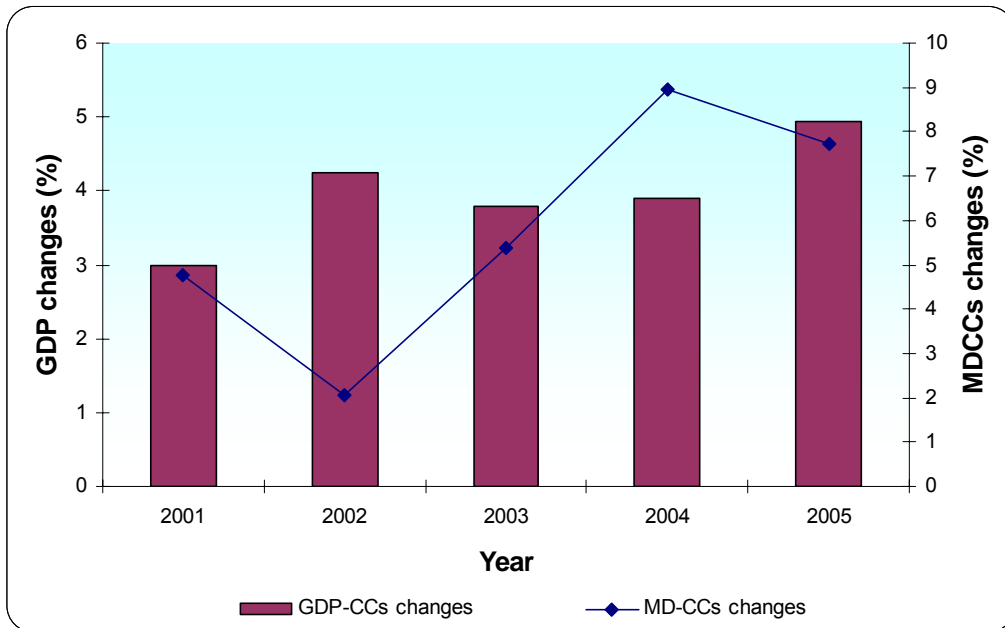


Figure 4-2: Changes in the GDP and the maritime demand of CCs

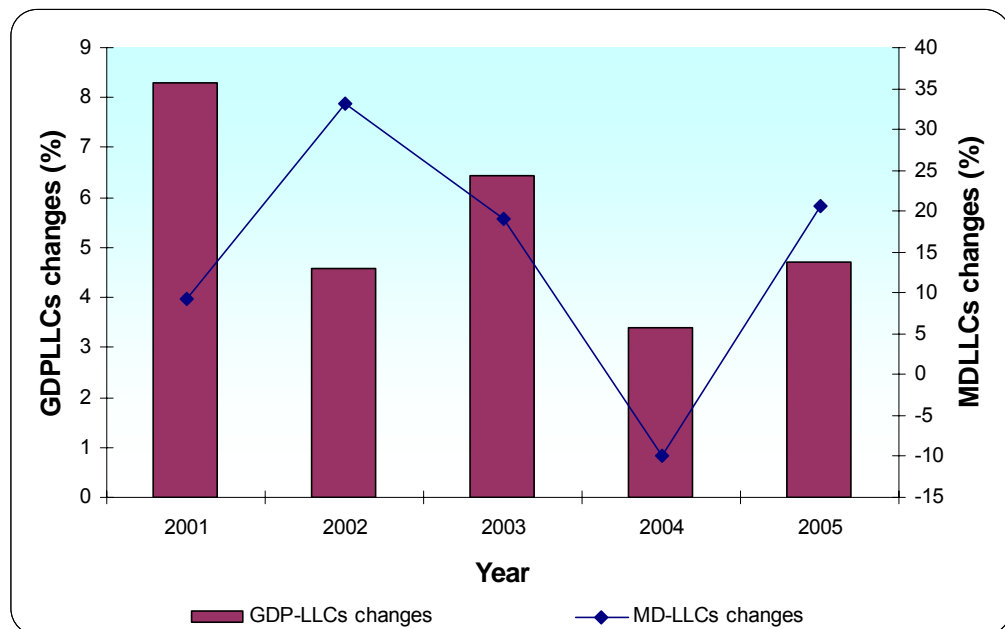


Figure 4-3: Changes in the GDP and the Maritime demand of LLCs: 2000-2005

The above analysis and interpretation of the results yielded show that the considered hypothesis is verified. Port traffic demand changes faster than changes in the GDP in the region. This demand is characterised also by different imbalances based on the nature of the imported and exported goods.

4.2.2. Maritime transport in West Africa and the imbalances

There are similarities in the characteristics of the maritime transport between West Africa and the Sub-Saharan Africa. Hence, due to the limited availability of specific information on West African countries, the analysis has also been based on the sub-Saharan African countries.

4.2.2.1. Cargo loaded and unloaded imbalance

UNCTAD, through the review of Maritime Transport developments in Sub-Saharan Africa 2003 and 2006 has pointed out that there is a huge imbalance in the total cargo handled by these countries. This imbalance is explained by the large amount of crude oil loaded especially from the oil exporting countries of West Africa (Nigeria, Gabon, Angola and Equatorial Guinea). The unloaded cargo represents a quarter of the loaded cargo (See Table 3-6, p30).

4.2.2.2. Container traffic imbalance

Even though, there is a significant increase in the container throughput in African ports, their contribution to the world total throughput is still small. According to the UNCTAD secretariat, this figure was estimated to be 3.3% of the world total in 2005. This particular traffic is also characterised by an imbalance (See section 3.9.4 p 31). The traffic between the African West Coast and Europe illustrates perfectly the situation for the simple fact that African countries trade with Europe, more than any other continent. Over the period 2004-2006, Europe represented their largest import market with a share of 49.25%, almost half of their total imports. As regards the

destination of their exports, Europe still represents the largest market with a share of 40.59% of their total exports (See Appendices A- 1 and A- 2).

4.2.2.3. Imports and Exports imbalance

Another imbalance worth noting is the one related to the imports and exports. Among the SWACs, only Côte d'Ivoire has recorded a positive balance between the exports and imports (See Table 3-5, p 29)

The maritime transport in West Africa is, indeed, characterised by imbalances in terms of the type of traffic handled by ports which is dependent on the trade demand of the studied countries. The following section consists of confirming or infirming the existence of inter-port competition in the region through the analysis of ports' traffic structure.

4.3. The analysis of West African Ports' market share

Over the period 2000-2006, the annual average throughput handled by the SWAPs is about 44.901 million tonnes including national, transit and transshipment traffic of 35.30; 4.24 and 5.36 millions tonnes respectively (See Appendix B- 9).

4.3.1. Ports traffic structure analysis

The structure of the total port traffic consists of national traffic, transit traffic and transshipment traffic. Transit traffic is split up into traffic generated by LLCs, and other CCs respectively (See Table 4- 2)

¹ This figure includes the transshipment traffic recorded twice.

Table 4-2: SWAPs port traffic structure (2000-2006)

Markets	Traffic in tonnes by selected port				
	Abidjan	Cotonou	Dakar	Lome	Tema
Burkina Faso	284135	45702	0	524655	278271
Mali	405770	23724	410180	112913	202004
Niger	698	730632	0	159248	115618
Transit-LLCs	690603	800057	410180	796816	595892
Transit-CCs	9928	685451	78023	200817	34984
Total transit	700531	1485508	488203	997633	630876
National	15912202	2769208	7268941	3228224	6983410
National + Transit	16612733	4254716	7757144	4225857	7614286
Transshipment	1936470	0	665303	169386	130339
General Total	18549203	4254716	8422448	4395243	7744625
Traffic in percentage of the general total					
Burkina Faso	1.53	1.07	0.00	11.94	3.59
Mali	2.19	0.56	4.87	2.57	2.61
Niger	0.00	17.17	0.00	3.62	1.49
Transit-LLCs	3.72	18.80	4.87	18.13	7.69
Transit-CCs	0.05	16.11	0.93	4.57	0.45
Total transit	3.78	34.91	5.80	22.70	8.15
National	85.78	65.09	86.30	73.45	90.17
National + Transit	89.56	100.00	92.10	96.15	98.32
Transshipment	10.44	0.00	7.90	3.85	1.68
General Total	100.00	100.00	100.00	100.00	100.00

The above table is derived from port traffic related tables and represents the annual average traffic of each port over the period 2000-2006 and is expressed both in tonnes and percentage.

This table shows that the national traffic represents more than 80% of the total traffic for Abidjan (85.78%), Dakar (86.30%) and Tema (90.17%). The one for Lomé port accounts for 73.45% whereas Cotonou counts on its national cargo only for 65.09%

of its total traffic. Globally, the national hinterlands in West Africa are still captive markets for ports even if they have been extended to other markets beyond the national boundaries.

On the other hand, the share of LLCs traffic in the total traffic represents 18.80%; 18.13%, 7.69%, 4.87% and 3.72% for Cotonou, Lomé, Tema, Dakar and Abidjan respectively. These figures show, therefore, the different ports' dependence on the transit traffic. Benin appears to be highly dependent on non-local cargo. This situation is explained by the large role played by the share of the traffic from its neighbouring coastal countries (16.11%), a share very close to the share of the traffic from LLCs (18.80%). For example, the total traffic from or to Nigeria accounts for almost 16 % of the Benin total traffic transit.

The transshipment business appears to be very small, since it represents only 10.44%; 7.90%; 3.85% and 1.68% of the total traffic handled respectively by Abidjan, Dakar, Lomé and Tema.

Without doubt, none of the West African ports is a dedicated transshipment port. This particular traffic is still insignificant compared to some dedicated ports which handle even more than 70% of their total throughput as transshipment cargo. The port of Colombo (Sri Lanka) is one of those. Transshipment traffic represents 10.44%; 7.90%; 3.85% and 1.68% of the global total traffic for the respective ports of Dakar, Abidjan, Lomé and Tema, which is still a very small proportion. Cotonou is not involved in the transshipment business due to the draft limitation of the port.

The fact that ports in West Africa are well implanted in their own local market leads to the conclusion that they have a very high competitive advantage over this particular market segment. Their lesser involvement in the other CCs traffic prompted the focus of the following section to the study of the transit market as

regards the landlocked countries as well as the transshipment market. The tool used for this purpose is the analysis of ports market share at the regional level.

4.3.2. Market share

Due to the socio-political crisis in Côte d'Ivoire, which has impacted seriously on port activities from 2002, account has been taken to provide a comprehensive and unbiased analysis.

4.3.2.1. Burkina Faso Market

In 2000 and 2001, before the intensification of the crisis in Côte d'Ivoire, Abidjan was the leader of the Burkina-Faso market with 53.72% and 54.81% respectively of this particular market. Over the same period it was followed by Lomé port with 39.66% and 34.73% respectively of the market leaving the balance over the same period to Tema and Cotonou ports. Meanwhile, Dakar is totally absent in this market (See Figure 4-4 and Appendix B- 10)

From 2001, due to the previously mentioned crisis, the trend has begun to change in the disfavour of Abidjan port. Traffic initially handled by Abidjan has been switched to other regional ports including mainly Lomé, Tema and Cotonou. However, Lomé has seen its position of leader consolidated over the period 2000-2006 in this particular market with an annual average market share of 44.33 %. It is followed by Abidjan with an annual average market share of 29.13 %.

4.3.2.2. Mali Market

From 2000 until 2002, Abidjan held the lion's share of the Mali port demand market with a market share of around two thirds. Although the leadership position of Abidjan was stolen by Dakar port over the period 2002 and 2006, Abidjan port, with an average annual market share of 39.61%, remains the leader over the whole period 2000-2006 (See Figure 4-5 and Appendix B- 11)

4.3.2.3. Niger Market

Unlike the Burkina Faso and Malian markets where Abidjan had a strong position in 2001, the Niger Market is very much dominated by Cotonou port. In 2000, the record was 69.04 % for Benin, which was followed by Togo with 18.21%. From 2000 until 2006, Cotonou port has gradually consolidated its position to reach an average annual market share of 73.12 % over this period, and hence, seems not to have an immediate challenger in this market. Unlike other SWAPs, Dakar port is again not present on this market (See Figure 4-6 and Appendix B- 12).

Nevertheless, it is important to highlight the leader role the port of Abidjan was enjoying before its socio-political crisis on both Burkina-Faso and Mali. This crisis has led to the shift of the major part of the traffic generated by these markets from Abidjan to respectively Lomé and Dakar. At the same time, Tema port has seen its traffic more than double over the two previously mentioned markets.

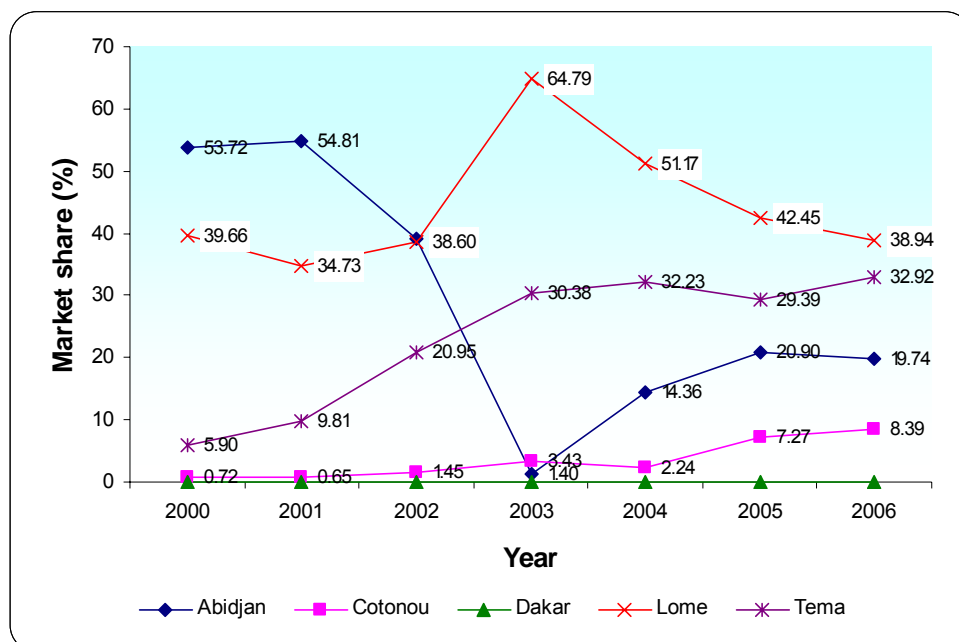


Figure 4-4: Market share over Burkina-Faso market

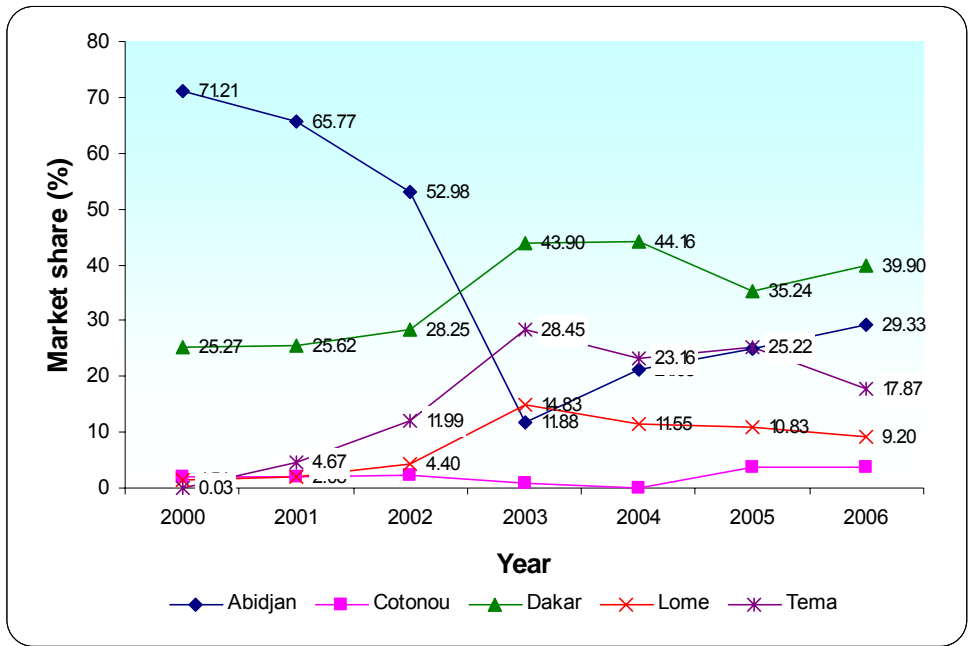


Figure 4-5: Market share over Mali market

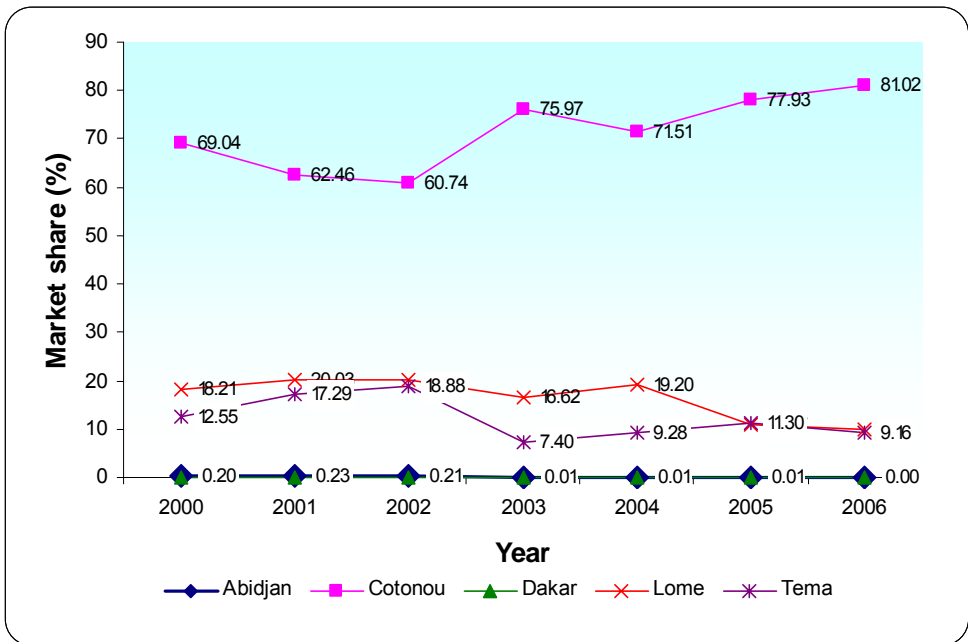


Figure 4-6: Market share over Niger market

4.3.2.4. Transshipment Market

Based on the analysis of the ports traffic structure, it has been stated earlier that none of the studied ports is a transshipment port. Even Apapa port (in Nigeria), one of the largest ports in West Africa, is not a transshipment port. However, transshipment activities do take place in these ports with the exception of Cotonou (See Figure 4-7 and Appendix B- 13).

The overall picture of the transshipment activities in the sub-region is that Abidjan port, in spite of its socio-political crisis, has remained the leader of this particular market over the period 2000-2006 with an annual average market share of 73.39%. It is closely followed by Dakar port with an annual average share of 20.09% over the same period. The market share balance is left for Lomé and Tema ports only as Cotonou port is absent from this segment.

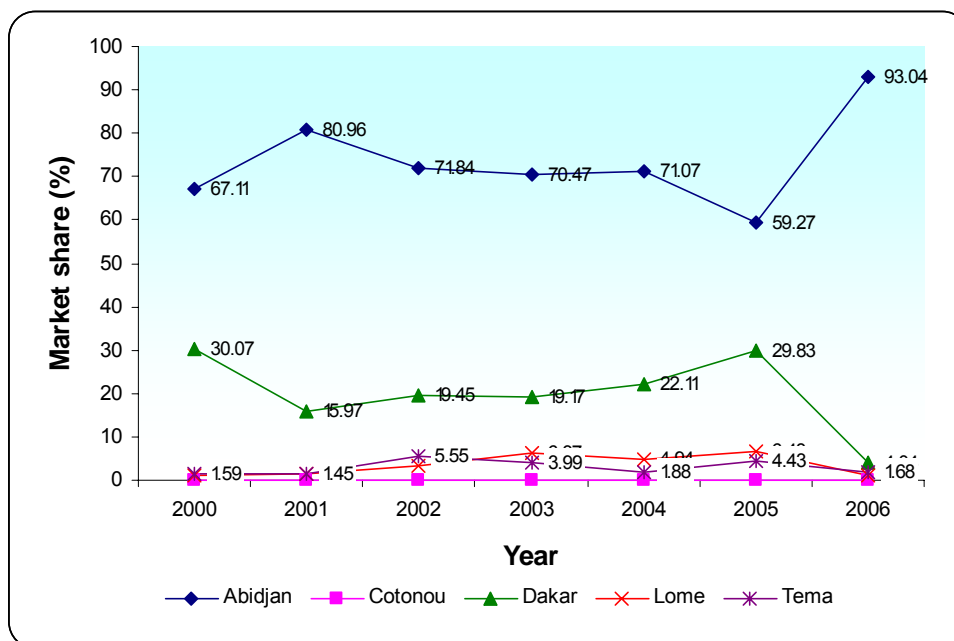


Figure 4-7: Market share over the transshipment market

4.3.3. Container concentration in the West African ports

There is a concentration of container traffic in West Africa. The seaborne container traffic handled by both Abidjan and Tema ports accounts for two thirds of the total container traffic handled by the SWAPs. This has been illustrated by the Herfindahl index (See Figure 4-8 and Appendix B- 14). It is, however, worth noting that this concentration has decreased over the period 2000-2006. From 0.31 in 2000, the Herfindahl index has declined to 0.22 in 2006 (See Figure 4-9).

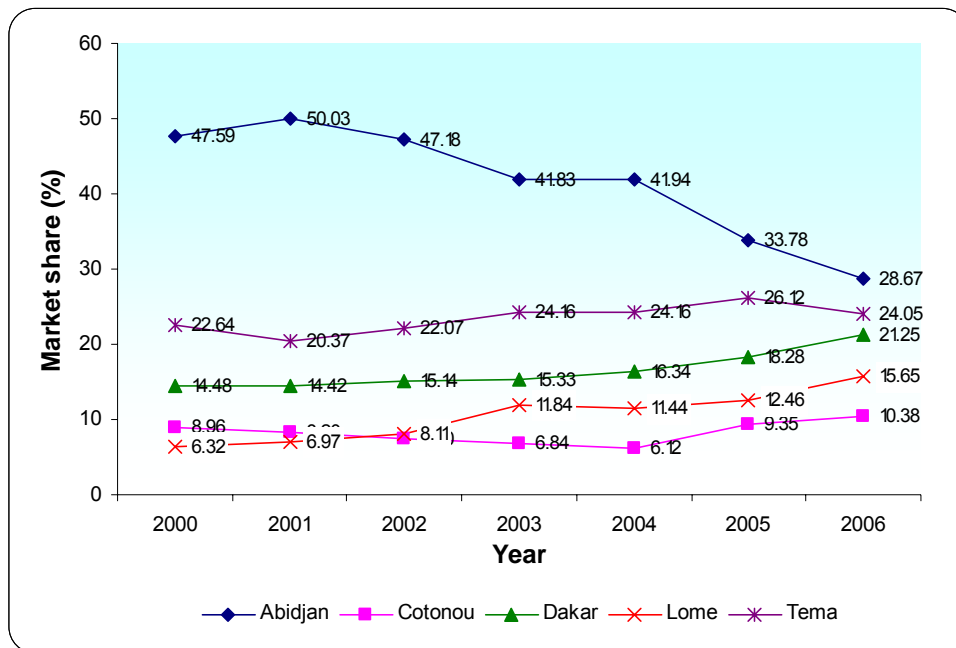


Figure 4-8: Concentration of the container market in West Africa

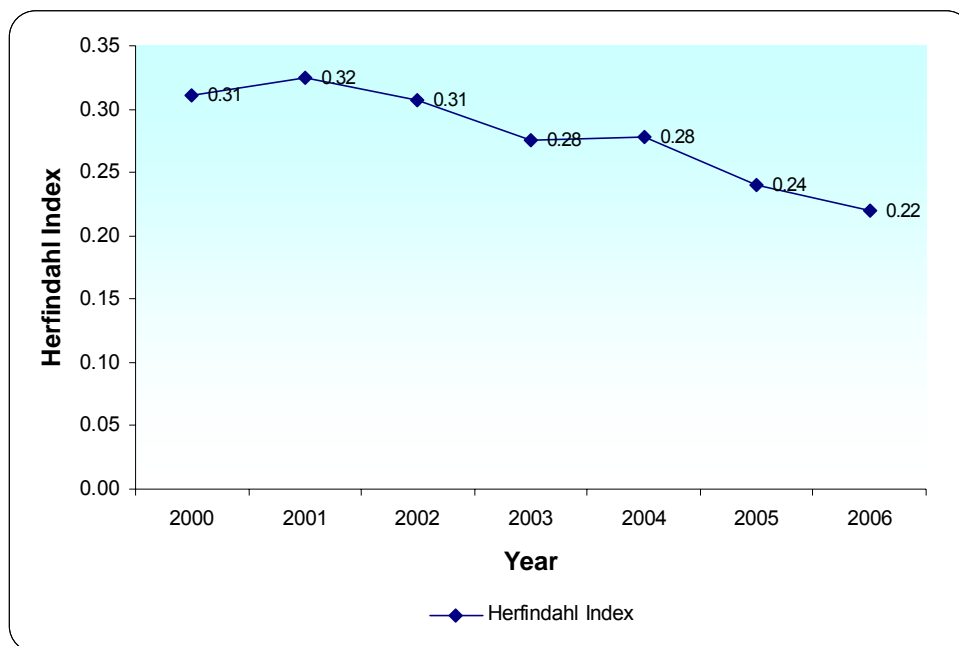


Figure 4-9: Herfindahl Index for the SWAPs: 2002-2005

4.3.4. Transshipment ports in West Africa

The level of this particular traffic is very small in West Africa. It could be contended that there is a new transshipment port trend according to which transshipments ports can emerge even with almost no local cargo. Freeport (Bahamas), Algeciras (Spain), Marsaxlokk (Malta), and Gioia Tauro (Italy) are some cases to be cited in this respect.

The West African region is characterised by a multitude of small ports and, due to the increase in container throughput, there is a likelihood for the development of feeder services in addition to intercontinental transport. While the former will be carried out by a niche of local shipping lines, the latter will be fulfilled by mega carriers or global shipping lines (Pálsson et al., 2007, p. vii)

According to the Economic Commission for Latin America and the Caribbean (ECLAC), already in 1998, the World Bank conducted a study on Abidjan and Lagos

to determine the likelihood of either one of them being chosen as a transshipment port for West and Central Africa (ECLAC, 1998), but the materialisation of such a project has not yet taken place.

Regardless of the position of a port as a primary or secondary port, what matter most for the port users is the minimisation of their turnaround time. The length of the time in port of their vessels denotes the efficiency of the port they are calling. Hence, it is important to assess the efficiency of the SWAPs based on the accessible information.

4.3.5. West African Ports' efficiency

4.3.5.1. DEA application

Similarly to Wiegmans (2003) in the assessment of European terminals, the outputs and inputs considered for DEA application (See section 3.5, p.25) are respectively the number of TEUs handled and the size of the terminal area as well as the number of ship to shore cranes (2003, p. 103). The total quay length of the container terminal is an additional input considered for the same purpose. To achieve a given level of output, the global productivity of each of the studied ports is the result of an efficient combination of various inputs including the size of the terminal area and the amount of available ship operation equipment (Cariou, 2008b).

To conduct a reasonable and comprehensive comparison of the efficiency of West African ports, account has been taken of the type of equipment used in order to avoid biased results. In 2006, Abidjan and Tema each had three gantry cranes, whereas Cotonou, Lomé and Dakar ports were still relying on geared vessels for the container handling operations. Even though Lomé port acquired its mobile cranes in 2006, they were not put into use before 2007.

The results generated by the DEA software are summarised in Table 4-3.

Table 4-3: DEA result

DMUs No	DMU Name	CRS	
		Technical Efficiency	Return
1	Abidjan	0.74124	drs
2	Cotonou	0.60449	irs
3	Dakar	1.00000	crs
4	Lome	1.00000	crs
5	Tema	1.00000	crs

CRS: Constant Return to Scale, irs: increasing return to scale, drs: decreasing return to scale

The result yielded from the DEA applications reveals that the container terminals in the ports of Dakar, Lomé and Tema are efficient considering the indicated inputs and outputs. However, Abidjan and Cotonou are rather inefficient. While Abidjan port is in excess capacity in terms of container yard, total container quay length in use, Cotonou port experiences severe physical constraints as regards to port capacity. This result obviously meets expectations, which present the reality. In fact, Abidjan has the ambition to serve as a transshipment port in the region, which justifies the identified excess capacity. On the other hand, Cotonou port, initially meant for a theoretical traffic (all types of cargo) of 2.5 million tonnes, handles today more than 5 million tonnes.

These results do not confirm the common assumption as regards to the operations of container terminals in Europe which holds that larger terminals are more efficient than smaller ones (Wiegmans, 2003, p. 103). Abidjan and Cotonou are respectively bigger than Tema and Lomé, yet they are correspondingly less efficient.

It could be argued that Abidjan has still not recovered from the socio-political crisis which started in the late 2000s. Consequently, this crisis might have led to the

reduction of the foreseeable trend in a non-crisis environment (normal case). A counter argument will mention the normal case of Cotonou.

4.3.5.2. LSCI and DEA

A cross analysis between the LSCI (See 3.16 p. 40) and port efficiency (See the above section) shows some similarities. Hence, the result as regards to the efficiency seems to be confirmed. It has been said earlier that there are some parameters which determine the port choice of shipping lines. These factors are indeed cost-based and service-based. To them, the time in port of their vessels should be shortened as much as possible. Therefore, the more efficient ports are, the more they save their total cost in ports. In this respect, in 2006, Tema had greater efficiency than Abidjan; hence its LSCI (13.8) is greater than the one of Abidjan, which has the same position as Nigeria (13). However, it is to be mentioned that the Nigerian index might have been seriously affected by the existence of piracy in Nigerian waters. On the other hand, in the same year, Togo's index (11.1) was slightly higher than the one for Benin (11) while it has been identified that Lomé was more efficient as compared to Benin over the same year.

4.3.5.3. Port usage factor

Tiwari et al. have defined the port usage factor as the volume of cargo handled per quay length (2003, p. 29). This factor is an indicator of port performance. It can be used to measure the efficient use of the terminal quay length.

Abidjan port appeared to use more efficiently the container terminal quay length than the other SWAPs. It is followed respectively by Lomé, Tema, Cotonou and Dakar. This result in comparison to the Chinese ports considered by Tiwari et al. (2003) show that there are some discrepancies in terms of port usage factor. The ones of SWAPs range from 2058 to 6310 tonnes for the year 2006 whereas the ones of the pre-indicated Chinese port which range from 4580 to 8350 ten years back (See Table

4-4 and Appendix B- 15). This is an important gap if the period of time is to be considered.

Table 4-4: Comparison between Chinese and West African ports usage factor

Chinese ports (*)	1998	SWAPs	2006
	Usage factor (tonnes/m)		Usage factor (tonnes/m)
Shanghai	8350	Abidjan	6310
Quangdao	8020	Cotonou	4999
Tanjing	6250	Lome	4967
Dalian	5610	Tema	4391
Other ports	4580	Dakar	2058

Source (*): Tiwari et al. (2003, p. 29)

It has been acknowledged earlier that ports in West Africa are not efficient, globally speaking. However, some of them are better than others taking into consideration the results yielded by the DEA application. Subsequently, ports in this region still have a very strong competitive advantage over their national traffic due to the fact that there is a non existence of efficient ports in the region which will yield advantages in cost for neighbouring coastal countries' shippers that can offset the switching costs. The switching costs include additional costs incurred by the shippers related to the transportation of the goods from their country to the selected neighbouring port as well as the time cost. In fact, there are numerous factors that impede the smooth flow of goods between countries in the region due to cumbersome customs clearance and escort formalities, relatively poor road infrastructure, numerous checkpoints along the roads and illegal fees collected from truckers. These constraints could be summed up as the non-enforcement of the existing trade facilitation regulations, the inadequacy of logistic supply chain due to the non-promotion of roads and railways network between countries.

4.3.6. Shipping line concentration in West Africa

Related to the eleven main identified trade routes linking West Africa and other regions (See Table 3-15, p.40), it can be seen that the number of shipping lines has undergone some changes over the years. The overall picture shows an increase in this number from 89 in 2000 to 92 in 2007, an increase of almost 4%. However, it can be noticed that a clear decrease in the main actors on some trade routes in favour of some others. For instance, the number of shipping lines on the West Africa-South America route has grown from 4 to 30 whereas there has been a decrease in the number of shipping lines serving the 9 remaining shipping routes.

As a matter of fact there has been a fall in the number of the main players on the West Africa-Europe trade route. From 39 in the beginning of 2000, this number has declined by almost 26% to 29. In the meantime, even though the maritime transport demand on the trade route West Africa-Far East is still small in comparison to the European one, the number of shipping lines offering regular services on this particular route has changed from 6 to 10 over the same period, an increase of about 67%. This could confirm earlier studies proving that European trade with Africa is declining to the benefit of other group of countries, notably Asian countries, notably China.

It could be also argued that the number of shipping lines has decreased due to the effect of concentration in the shipping industry. Some of the listed carriers belong to the same owner. Delmas and OTAL belong to Bollere group (France) and Maersk and Safmarine to AP Moller (Denmark) (UNCTAD Secretariat, 2003, p. 114). In reality, two important shipping lines serve West Africa, notably Delmas with 55% of the West African traffic; and Maersk. To ensure its weekly services to West Africa from a number of European ports, Delmas has vessels ranging from 1500 and 2200 TEUs geared vessel. Maersk provides a feeder service to West Africa from its European transshipment ports, especially Algeciras (UNCTAD Secretariat, 2003, p. 113).

Nevertheless, it is understandable that West-African countries have a bigger commercial partnership with Europe. The UNCTAD Secretariat in the review of regional developments as regards to Sub-Saharan Africa has given the details of their imports and exports in value as well as the destination of the exports. It has been noticed that 47% of their exports is meant for the European Union followed by Asia accounting for a share of 15.2% (2006a, p. 103).

4.3.7. Shipping lines response to the changes

Although there have been few maritime studies for West Africa, Pálsson and his co-authors have given an overview of the shipping line concentration in this region. According to them, shipping lines have established different strategies to cope with the changing environment in West and Central Africa (2007, p. 13). They pointed out the 1974 Code of Conduct for Liner Conferences and the 40-40-20 rule as the factors that have contributed to the substantial role of shipping until 1990. Meanwhile, as a consequence of this rule, several shipping companies have come into existence without possessing a single ship and have based their business on selling their country's share of traffic to other outsider companies with no responsibility as to quality and cost of services.

The shipping policy reforms recommended by UNCTAD to ensure competitiveness and competition in the business for the benefit of all the different stakeholders and their consideration by the European Union (EU) and the African, Caribbean and Pacific (ACP) states through the Cotonou II agreement have resulted in the end of the 40-40-20 rule in many countries. To a great extent this, in turn, has led to the decrease in the number and scope of national shipping lines.

Following the withdrawal of national shipping lines, the shipping industry in West Africa, similarly to other parts of the world, is dominated by a handful of companies operating mostly under the umbrella of consortia.

Pálsson et al have given credit to Hartmann on his studies on “Shipping Trade Agreement between Europe and West Africa” who pointed out the collapse of the existing conferences² in the Europe-West Africa trade. This constringent withdrawal was the consequence of the positive response of the European Commission to the reaction of Maersk. The Europe West Africa Trade Agreement (EWATA) was set up by some carriers (almost 50% market share) involved in the previously mentioned trade in 2000 to stabilize rates. Meanwhile, Delmas and OT Africa Line (OTAL) remained outsiders with an eye on the pricing of the newly established conference.

The joining of Delmas and OTAL to EWATA in 2003 led to more concentration of the business since they had a control of almost 75 % of the said market. Meanwhile, this entrance was followed by the P&O Nedlloyd and West-Afrika Line respectively in the second semester of 2003 and 2004.

Nevertheless, EWATA, made up of 7 members in 2008, will terminate its operations on 17 October 2008 due to the repeal of the liner conference exemption in EU Regulation 4056/86 (EWATA, 2008).

Port competition in West Africa is a real matter more especially over the LLCs markets as well as the transshipment market. This has been confirmed by earlier studies.

For instance, Pálsson, through his impressive research on the benefit of a hub and spoke system in West Africa, as compared to a multiple calls system, has given the idea on competition that CCs could be engaged in positioning themselves as transshipment ports (1998). On the other hand, Vissiennon and Alix highlighted the importance of West African port services that are offered to shippers and made a

² The shipping lines conferences engaged in the Europe –West Africa trade route until the mid-90s include the Continent West Africa Conference (COWA), UK-West Africa Lines (UKWAL), Central - West Africa Lines (CEWAL) and Mediterranean-West Africa Conference (MEWAC).

synoptic analysis of the competition faced by the port of Cotonou (Benin) as regards to other ports in the sub-region, notably Lomé, Tema and Abidjan (2003). Lugué, in his dissertation entitled “A comparative study of import transit corridors of landlocked countries in West Africa” has pointed out the rudeness of the competition over LLCs market as well as the qualitative factors that influence shippers’ port choice (2004). On the other hand, Alix viewed port competition in the range Cotonou-Dakar with more emphasis on the evolution of concentration of containerisation together with the changes in terms of cargo handling operations attracting terminal operators in the region (2008).

In response to the challenges of the competition, ports in the region have specific strategies to cope with the situation.

4.4. Ports’ marketing behaviour to cope with inter-port competition

Like other ports in the world, West African ports have understood the importance of marketing for their business. Hence, different strategies are being adopted and implemented in this sense.

The following section has been inspired by the example of the table related to the promotional activities presented by Cahoon in his paper entitled “Marketing communications for seaports: a matter of survival and growth (2004). It is the result of information collected through phone calls to the concerned ports and analysis of important facts related to Marketing as well as searching among various sources.

The marketing activities are focused on the 3Ps referred to by Bernard (1995) (See section 2.6.2, p.15). Even if the pricing strategies of ports are different depending on their objectives, there are similarities in terms of their products and promotional activities.

4.4.1. Similarities in their products

The conservancy services, handling of ships and cargo provided by the ports are common aspects of the ports of our focus in the sense that they are the reason for their existence.

Facing the situation of the intra-port competition over LLCs market, Lomé port especially has developed an extra service differentiating it from others. This service is called “Solidarité sur la Mer” or “Solidarity at Sea”.

4.4.1.1. “Solidarité sur la Mer” Operation

Initiated in July 1993 by the “Port Autonome de Lomé”, this extra service consists of conveying in escort all the transit traffic from “Terminal du Sahel” to Cinkasse at the Togolese border with Burkina Faso. “Terminal du Sahel” is a marshalling area for trucks located in the North of Lomé. The escort is conducted by a team including port, customs, police and gendarmerie officers. The success of this operation is due to the fact that it has helped not only to significantly reduce road blockages and bribery along the corridors but also to reduce delays and extra cost for the benefit of the shippers and the transporters.

The success of this service in combination with the lack of Lomé port’s ownership over it has prompted the port of Cotonou to initiate a similar service in Benin that has been referred to by Vissiennon and Alix in their article entitled “La déserte des pays enclavés: l’exemple du corridor beninois en Afrique de l’Ouest” (2003)

4.4.2. Promotional activities

The promotional activities are quite similar to the ones suggested by Bernard (1995) in his monograph published by UNCTAD as regards to marketing. They are summarized in Table 4-5

Table 4-5: SWAPs’ marketing activities

Marketing activity	Sea ports						% ports
	Abidjan	Cotonou	Dakar	Tema	Lome	Lagos	
Website	x	x	-	x	x	-	66.7
Media releases	x	x	-	x	-	-	50.0
Conference presentations	x	x	x	x	x	x	100.0
Brochures	x	x	x	x	x	x	100.0
Port tours	x	x	x	x	x	x	100.0
Advertisements in trade magazines	x	x	x	x	x	x	100.0
Sponsorships	x	x	x	x	x	x	100.0
Downloadable information on the web	x	x	-	x	-	-	50.0
Funding of community related projects	x	x	x	x	x	x	100.0
Advertisements in newspapers	x	x	x	x	x	x	100.0
Seminars on port-related issues	x	x	x	x	x	x	100.0
Port video	x	x	x	x	x	x	100.0
Port open days	x	x	x	x	x	x	100.0
ISO accreditation	x	-	x	-	-	-	33.3
Television advertising	x	x	x	x	x	x	100.0

Based on the first semester 2008, it has been noticed that Nigeria Ports Authority and “Port Autonome de Dakar” do not have functional websites. According to the Authorities of the port of Dakar, their website is still under construction because the previous one was outdated and needed to be replaced.

4.5. Marketing in West Africa: A necessity

It has been mentioned earlier in chapter 2 that marketing has become a great concern of ports nowadays due to several reasons including the fierce competition brought about by competitive challenges in the industry coupled with technological changes.

The promotional activities being carried out by West African ports are of utmost importance in the era of privatisation. In this respect there are numerous changes in ports aiming at the improvement of their performances. These changes should be made known to the customers for the benefit of the port and the only way to do it is through port promotional activities.

Due to the intervention of different actors in the business of the ports, and thanks to the idea of port community being understood and adopted by West African ports, all the stakeholders are involved in the promotion of the port for their mutual benefit.

Even though promotional activities aim at maintaining and attaining current and potential customers and helping a port to achieve its goals, such as increasing traffic and/or maximising profit, it becomes necessary to measure to what extent customers are influenced by these activities. For the purpose of this paper, only customers or shippers from landlocked countries are considered. The reason is that they are a captive market for West African regional ports and hence of a great interest.

It has been felt that identifying the influential factors contributing to the decisions of shippers from landlocked countries in port selection is another way of perceiving the extent to which marketing could influence their decisions.

Chapter 5: Factors influencing the decision of shippers in landlocked countries in West Africa

5.1. Introduction

Port competition in West Africa is a reality more especially as regards to the LLC markets. Therefore, marketing has become a major issue and concern for the strategic management of West African ports. Different tools are used to maintain and attract customers or simply to satisfy shippers' needs. According to Nuzum, the wants of shippers today from freight carriers are capacity, reliability and rate stability (2006, p. 1). They are very much concerned with minimising their total logistics costs. Therefore, their wishes or wants are to see their costs reduced at every single node of their modal chain. In addition to the cost related to the maritime transportation and port cost, shippers from LLCs incur extra costs related to the transit of their merchandise until the final destination is reached (LLCs).

It has been confirmed that African countries bear very high transportation costs and LLCs even more. Therefore, other factors to be considered as likely to influence LLCs shippers' port choice is the cost related to the transportation of goods from or to the port to be selected as well as the final destination. They include, according to Coulibaly and Fontagné, the border, distance, transit and infrastructure factors (2005).

This chapter will first analyse the evolution of the share of the freight rate as a percentage of the import value of goods in West Africa. The second step will consist of testing the hypothesis according to which the distance has an influence on LLCs shipper's port selection decisions (H1). Although, there are differences depending on sources, in the number of countries that constitute the West African region, only

Burkina Faso, Mali and Niger, the only three LLC members of the West African Economic Union (WAEMU), will be considered in this analysis. As for the connections, only the ports studied in Chapter 3 (SWAPs) have been considered, namely the ports of Abidjan, Cotonou, Dakar, Lomé and Tema. The further steps will give the opportunity to explore other determinant factors likely to influence shippers' behaviour.

The first step will be conducted based on UNCTAD's various Reviews of Maritime Transport. The testing of the hypothesis H1 will be done through a simple correlation analysis using the Excel tool called Data Analysis. However, the last step will be the result of critical observations of inter-regional trade patterns in West Africa enlightened by numerous documentations on trade facilitation published by UNCTAD through its Website.

5.2. Variables

5.2.1. Port selection alternatives

The test takes into account three LLCs (Burkina-Faso, Mali, Niger) and five ports (Abidjan, Cotonou, Dakar, Lomé, Tema); hence, a combination of 15 alternatives (See Figure 5-1).

The countries' capitals have been considered as the centre of gravity of commercial activities; namely, Ouagadougou, Bamako and Niamey.

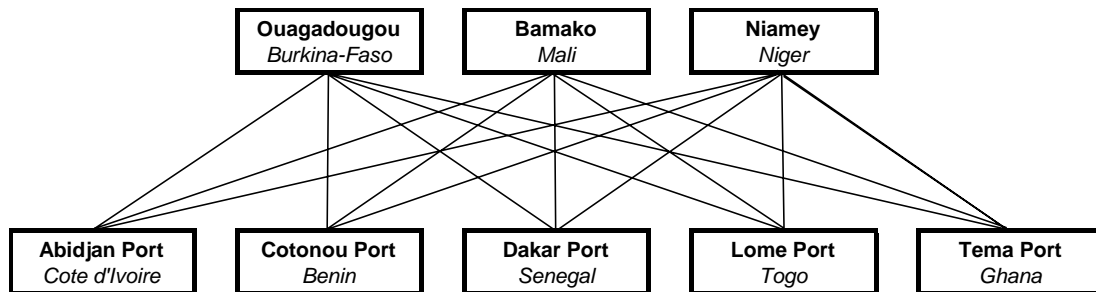


Figure 5-1: LLCs' shippers port selection alternatives in West Africa

5.2.2. Distance from ports to LLCs commercial centre of gravity

Table 3-2 on page 27 summarised the distance between LLCs shippers' centre of activities and selected ports. Based on these figures Lomé is the closest port to Ouagadougou at a distance of 970 km. As for Bamako, the port of Abidjan is much closer than any other port to a kilometric distance of 1230. Meanwhile, the distance between Niamey and Cotonou port is the shortest at 1056 km.

It has been assumed that the traffic demand is mostly generated from the largest city (capitals). The reason behind this assumption is that even though the second largest cities (Gao, Bobo Dioulasso) might be relatively important commercial centres, the weight of this importance is not known. Similarly the export traffic from Arlit in Niger is unknown as well. Therefore, an attempt to use the average distance between both the capital city and the secondary city could lead to confusion and a misleading interpretation.

Distance and the port usage factor assimilated to port efficiency (See Table 4-4, p. 60) are the identified variables to explain the market share of each port over a particular LLCs' market.

5.2.3. Shippers' traffic demand to ports/ port market share

The analysis of the SWAPs market share in the previous chapter has shown a shift of the transit traffic handled by Abidjan to other ports, notably Lomé and Dakar due to the Côte d'Ivoire crisis. Hence, the situation during the period 2000-2001 is assumed to reflect the position of each studied ports in a situation without the Côte d'Ivoire socio-political crisis (conditional). Therefore, the effect of the distance has been measured following 2 alternatives. Alternative 1 is based on SWAPs over the period 2000-2006; and alternative 2 is based on the situation over the period 2000-2001. The purpose of this distinction is to avoid a biased interpretation as regards to the influence of the distance on the port transit traffic market share.

Appropriate traffic values are used for the calculation of ports' market share over LLCs markets. A summary is given in Table 5-1 together with the appropriate distance and port usage factor. The port market share is estimated by the equation (1).

$$Y_{it} = \lambda_{i0} + \lambda_{it} X_{jt} \quad (4)$$

Where

Y_{it} : Market share of the Port i $i = (1, 2, \dots, 5)$

λ_{it} : Coefficient related to the distance

X_{jt} : Distance between the port i and the LLC market j

λ_{i0} : Constant

t : Time subscript

Table 5-1: Port-city distance, usage factor and corresponding market share

Port-LLC city	Distance (Km)	Port usage factor (tonnes/m)	Market share (%)	
			Average 2000-2006	Average 2000-2001
Abidjan-Ouagadougou	1148	6258	29.13	54.27
Cotonou-Ouagadougou	1060	3687	3.45	0.69
Dakar-Ouagadougou	1970	2123	0.00	0.00
Lome-Ouagadougou	990	4081	44.33	37.19
Tema-Ouagadougou	1040	3974	23.08	7.85
Abidjan-Bamako	1230	6258	39.61	68.49
Cotonou-Bamako	2200	3687	2.08	1.93
Dakar-Bamako	1200	2123	34.62	25.44
Lome-Bamako	1790	4081	7.77	1.80
Tema-Bamako	1840	3974	15.91	2.35
Abidjan-Niamey	1688	6258	0.07	0.21
Cotonou-Niamey	1056	3687	73.12	65.75
Dakar-Niamey	2510	2123	0.00	0.00
Lome-Niamey	1200	4081	15.24	19.12
Tema-Niamey	1234	3974	11.57	14.92

Table 5-2 and Table 5-3 give the linear relationship between the different variables, both dependent and independent based on the indicated alternatives.

Table 5-2: Correlation coefficient between market shares 2000-2006 and independent variables

Variables	Distance	Port usage factor	Market share 2000-2006
Distance	1		
Port usage factor	-0.341802	1	
Market share	-0.635747	0.1558593	1

Table 5-3: Correlation coefficient between market shares 2000-2006 and independent variables

Variables	Distance	Port usage factor	Market share 2000-2001
Distance	1		
Port usage factor	-0.341802	1	
Market share	-0.579348	0.4312219	1

The computation of the data related to both the distances and market share has yielded the equations (5) and (6) previously defined by the equation (1) (See Figures 5-2 and 5-3).

Period 2000-2006 : $Y_{it} = 60.758 - 0.0276 X_{jt}$ (5)

Period 2000-2001 : $Y_{it} = 64.028 - 0.0298 X_{jt}$ (6)

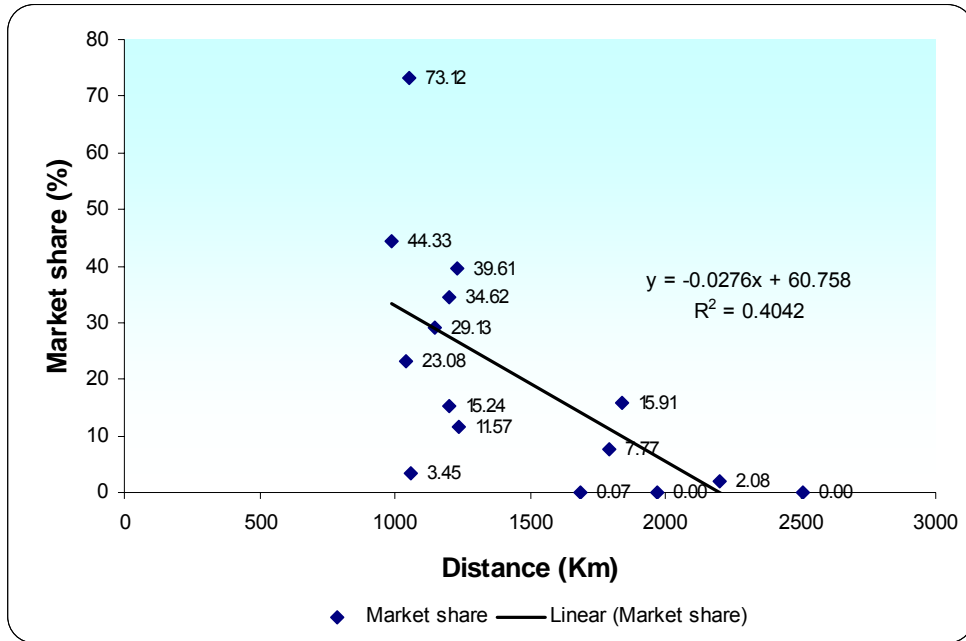


Figure 5-2: Linear relationship between port-LLCs city distance and market share: 2000-2006

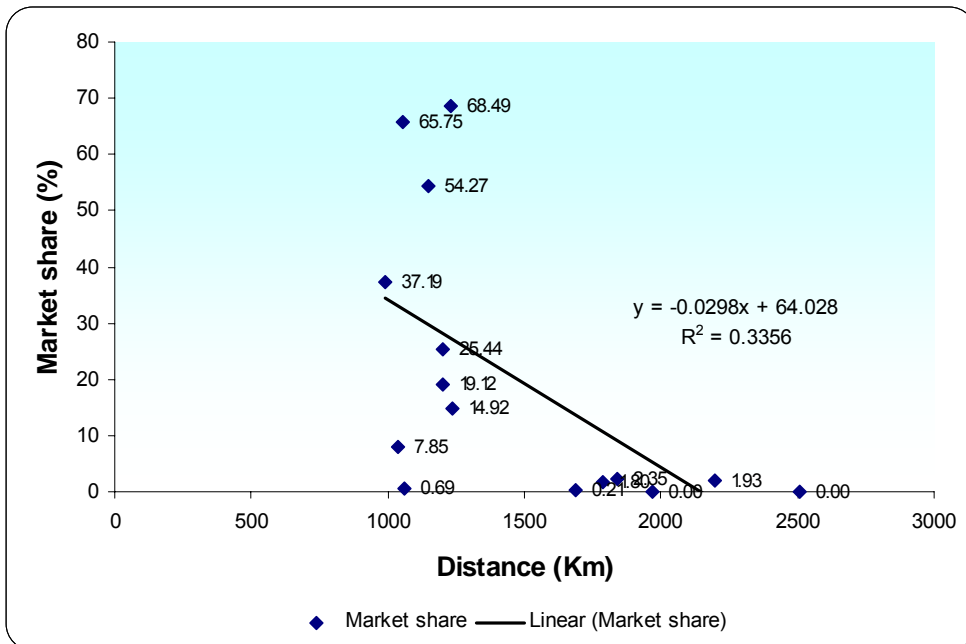


Figure 5-3: Linear relationship between port-LLCs city distance and market share: 2000-2001

Regardless of the alternatives, a positive relationship has been noticed between port market share and port usage factor (See Tables 5-2 and 5-3). This result has met this paper's expectation regarding the positive effect of the port efficiency on the market share. However, the value of the coefficient for the alternative 1 indicates that there is hardly a linear relationship between port market share and the usage factor. However, related to alternative 2, port usage explains the port transit traffic market share in only 43% of the cases.

Meanwhile, the result related to the distance is quite different and met this paper expectation too. In both cases there is a considerably strong negative relationship between distance and market share. The Ports' market share over the LLCs market in the sub region is explained by the distance between the port and the major cities in almost 64% and 59% of the cases respectively for the alternatives 1 and 2.

Irrespective of the alternatives, distance does not influence the transit traffic generated by LLCs shippers in ports at 100%. It appears, therefore, that there are other explanatory factors and, furthermore, this confirms the findings of earlier research.

Coulibaly and Fontagné have identified several factors depending on whether the trade is on a regional basis or international basis (2005, pp. 10, 11). To them, on a regional level, the trade can be influenced by a border factor, a distance factor, a transit factor, and an infrastructure factor. The first factor is the number of borders to be crossed by the imported or exported goods. The second one is the road distance between the two partners involved in the commercial business. The third one means the road distance from the first border to the last border crossed by the shipped goods. The last one, but not the least, is assimilated to the percentage of paved roads between the tow trading partners. However, these factors are reduced to two, including the average sea distance from overseas countries to all the southern coastal countries and the inland distance.

Port traffic in West Africa is largely extra-regional seaborne traffic, since to date short sea shipping is not promoted due to reasons including the high concentration of ports in the region and the lack of the required facilities. Therefore, the likelihood of LLCs shippers selecting one or another port in the region will be affected by all the factors mentioned above and identified by Coulibaly and Fontagné.

The above linear correlation analysis has confirmed the influence of the distance factor (road distance). It is thus important to explore the other factors that might impede LLCs shippers' port service demand as to whether to confirm or detect some additional impediments.

5.3. Other influential factors on LLCs port service demand

Distance is not an isolated influencing factor. It is, rather, associated with the transit cost and the total cost to be incurred by shippers for the shipment of their goods from one end to the other. It has been proved that the freight cost of imported goods as a percentage of the import value incurred by African countries is the highest in the world (See Table 5-4) (UNCTAD Secretariat, 2007, p. 78)

Table 5-4: Freight costs as percentage of import value

Country group	Freight costs as % of import value			
	1990	2000	2004	2005
World total	5.3	5.0	5.1	5.9
Developed countries	4.4	4.3	4.7	4.8
Economies in transition	6.6	7.8	5.5	7.6
Developing countries of which:	8.6	6.6	6.0	7.7
• Africa	9.4	9.6	10.3	10.0
• America	6.0	5.0	4.4	4.4
• Asia	9.2	6.8	5.9	5.9
• Oceania	9.5	9.5	10.0	9.6

Source: Derived from UNCTAD secretariat.(2007, p. 79). Maritime Review of Transport

The geography of trade is changing. Transportation costs and connectivity have been identified as factors having a larger influence on trade volume than maritime distance (UNCTAD Trade Development Board, 2007, p. 5). In an implicit way, maritime distance does not influence the international transportation costs but rather other variables including connectivity, port efficiency and economies of scale.

Both CCs and LLCs in Africa are also concerned with mainstream economic theory according to which “Countries that are further away from each other will trade less with each other” (UNCTAD Trade Development Board, 2007, p. 6), but LLCs face even more challenges. After the maritime transport, West African LLCs have to get their goods moved at least over a mean distance of 1320Km (See Table 3-2, p, 27) Even though the maritime distance does not affect the transportation cost much, distance is a main determinant of rail and road transport costs. In fact, this recurrent situation is resulting from a vicious circle where a trade deficit as regards to manufactured goods leads to higher import transportation cost.

The transit cost incurred by LLCs shippers has three components according to Graham (2007). It includes the transportation cost, other logistics costs and costs of time and delay. The transportation cost is the fees paid by the shipper to truckers or rail operators for the actual transit transportation services whereas other logistics costs are connected to the variety of fees and charges paid for transit procedures, freight forwarder costs, and legal or illegal facilitation payments. However, the costs of time and delay are referred to as costs including cost of inventory in transit, and cost of unreliability.

Rational LLCs shippers will have a preference for corridors through which the transportation cost of their goods will be minimised. Therefore, the likelihood is to choose ports linked with, not only better road quality, but also roads which are delay-free and harassment-free.

5.3.1. Road quality

The World Bank Research Group, in one of its research reports related to the transport network in Africa has estimated the Road Transport Quality index (RTQI) for Sub Saharan Africa based on the countries' percentage of paved roads, GDP and the World Bank's Country Policy and Institutional Capacity Index (CPIA), transparency, accountability and corruption shown in Table 5-5 (2006, pp. 9, 11).

Table 5-5: Road Transport Quality Index and market share of the SWAPs over LLCs markets

Country	RTQI	Market Share of major ports in selected country over a selected LLCs' market		
		Burkina-Faso	Mali	Niger
South Africa	100.00	-	-	-
Togo	37.00	38.94	9.20	9.81
Senegal	36.00	0.00	39.90	0.00
Nigeria	32.30	-	-	-
Ghana	27.00	32.92	17.87	9.16
Benin	25.10	8.39	3.70	81.02
Burkina-Faso	21.20	-	-	-
Côte d'Ivoire	14.40	19.74	29.33	0.00
Mali	16.50	-	-	-
Niger	11.00	-	-	-
Market		100.00	100.00	100.00

Source: Column 2 is derived from (Buys et al., 2006, p. 11)

Even though Africa as a whole, and West African countries in particular, are characterised by poor road quality in comparison with South African road connections (not a single country has scored above 50), some countries have relatively better road quality transport than others. This might attract or deter LLCs shippers from selecting a port.

Togo received the highest index score (37), which exceeds Senegal's by only one point. The following positions are occupied respectively by Nigeria (32.3), Ghana (27), Benin (25.1) and Côte d'Ivoire (14.4).

The Road Transport Quality Index is not the only factor affecting shipper's port selection, otherwise, Lomé port would have been the best port for their shipments. Lomé port's market share over the Burkina Faso market confirmed in a way the interplay of both the better road transport quality enjoyed by Togo and the short distance between Lomé and Ouagadougou as compared to others.

Although the RTQI for Benin is not as good as the one for Togo and Nigeria, shippers from Niger prefer the port of Cotonou. The distance factor has overridden the road quality factor. It should be tempting to come up with the conclusion that a shipper will have a preference for a port that has a better corridor quality and which is also closer to the LLCs' capital city. This conclusion can be misleading since in 2001, before the Côte d'Ivoire crisis, Abidjan was leading the market for Mali. It could be contended that the road quality might have been better at that time compared to Senegal's. The reason for this contention is that road quality might have gradually deteriorated from 2001. Roads might have been damaged or they might also have known enormous roadblocks, which deter the flow of the cargo along the corridor causing delays and additional as well as other avoidable costs.

Road Transport Quality is not only a matter of the physical quality of the road but also other factors that might influence the smooth flow of goods on a particular transit corridor. Those elements have been incorporated in the calculation of the RTQI and include the harassment of truckers, drivers causing delays and additional costs which are passed on to the shippers.

5.3.2. Impediments to the road service quality

It is a fact that trucks are abusively stopped along West African transport corridors. WAEMU in its effort to tackle the problem has set up a program called “Improved Road Transport Governance” (IRTG). Different surveys have been realized by IRTG not only to quantify the unknown number of roadblocks, barriers and bribes causing delays along the countries’ corridors, but also to detect the agents responsible (IRTG, 2007). Over the period 2006 to 2007, three surveys have been realized (the results are presented in Appendices C- 1, C- 2 and C- 3).

As far as the transportation system in the West African region is concerned, LLC shippers have very limited choice. In reality the transport network, including the road and railway systems suffers, from insufficiency.

5.3.2.1. Road transport network

WAEMU is made up of five coastal countries (Benin, Côte d’Ivoire, Guinea-Bissau, Senegal and Togo) and three landlocked ones (Burkina, Faso, Mali and Niger). The countries have a total road network of 146,352 km length with only 14% paved (See Table 5-6)

Table 5-6: Road distribution throughout the WAEMU

Country	Roads	% Paved	Denstiy/Km²
Benin	13842	9.46	10.80
Burkina Faso	13117	14.00	6.70
Cote d'Ivoire	68351	8.00	17.00
Mali	14776	17.00	2.00
Niger	13800	25.00	2.70
Senegal	14358	29.00	21.10
Togo	8108	20.00	28.40
WAEMU	146352	14.00	5.90

Source: (Coulibaly & Fontagné, 2005)

The network consists of three categories of road which are coastal roads (linking CCs), corridors (linking LLCs to the sea) and the trans-Sahel road (between Niger and Chad). Coulibaly and Fontagné pointed out that the network is unfairly distributed with a 70% concentration in the coastal countries covering only a surface area of 20% of the union. Moreover, the interstate road network is only 80% paved. This situation denotes the insufficiency of the road transport infrastructure. However, a paved road does not necessarily identify the condition of the road. For instance, between 1990 and 1997, the Togolese corridor presented serious deficiencies. Though paved, the corridor condition was characterised by 21% of the total corridor being bad, 36% relatively good and only 43% good. Even though the situation improved between 1997 and 2002, still 8% of the total road was in a poor condition (FER, 2004).

5.3.2.2. Rail network

Although the Nigerian transportation system includes railways, they do not reach any of the LLCs of the West African Region. They are only limited to the national scope. However, Côte d'Ivoire and Senegal, unlike Nigeria, have railways linking them to Burkina-Faso and Mali respectively.

The Côte d'Ivoire railway with a total length of 1148 Km links Abidjan to both Bobo Dioulasso and Ouagadougou, the second city and capital of Burkina Faso respectively. Meanwhile, the Dakar railway route originates from Dakar and joins Bamako over a distance of 1240Km.

Both the Dakar-Bamako and Abidjan-Ouagadougou rail links are colonial heritages from France. The first corridor dates back to the late 19th and early 20th century. Due to lack of maintenance and the wear and tear phenomenon, this corridor was often subject to breakdowns leading to its inefficiency in serving shippers. Abidjan-Ouagadougou was constructed between 1905 and 1954 and was also subject to the same challenges. However, the concession of these railways systems to

TRANSRAIL in October 2003 and to SITARAIL in March 1993 respectively has led to a change in the regulatory framework as well as the managerial system (Derosier, 2005; Mitchell & Budin, 1998). This was expected to contribute to the improvement of the efficiency of the railway transportation.

Again, like the road insufficiency, there is a lack of sufficient railway infrastructure in the region. This situation is not just random; it is the consequence of the low volume of cargo to be shipped by LLCs. There is a clear deficit balance of trade (imports exceed exports); therefore, the lack of sufficient amounts of cargo does not allow the benefit of economies of scale from railway transportation. So, the transportation cost increases and the more it does, the more it reduces the amounts of cargo to be shipped. Clearly, a vicious circle is established and becomes infernal (UNCTAD Trade and Development Board, 2007, pp. 10, 11)

5.3.3. Ports and corridor services quality

A study, commissioned by the Burkina Faso Ministry of Transport has been conducted by CATRAM consultants of Paris and the results were published in 2003. One aspect of the study was the focus on the corridor quality ranking presented in Table 5-7.

Table 5-7: Corridor ranking by CATRAM: result of 2002 survey

Criteria	Abidjan	Cotonou	Lome	Tema
Procedures	3.33	3.00	3.75	4.50
Storage	3.00	3.00	4.00	4.50
Cargo handling	3.33	3.00	4.25	4.50
Roadblocks	1.33	3.00	3.80	4.50
Security	3.00	4.50	4.00	4.50
Traffic congestion	3.33	2.50	3.60	4.50
Unofficial charges	1.00	2.00	3.33	4.50
Official charges	1.50	1.00	4.33	4.50
Billing transparency	3.00	3.00	4.33	4.50
Total	22.82	25.00	35.39	40.50

Source: Derived from (Luguye, 2004, p. 44)

Over the time of the study, it was revealed that Tema Port had the best ranking as regards the services provided, both in the port and along the corridor linking the studied countries to Burkina-Faso. Tema (40.50) was followed by Lomé (35.39), Cotonou (25) and Abidjan (22.82) respectively. This good ranking of Tema port was not a decisive advantage for the port, since Lomé had been chosen as the favourite of Burkina-Faso shippers. This finding prompted a new line of inquiry. Burkina-Faso shippers might not have had a good knowledge of the benefits they could gain by passing through Tema port as compared to Lomé port, or else there might be some other reasons that contributed to their choice. If the first argument holds true then the role of marketing was seen to pay off.

According to Ghana Ports and Harbour Authority (GPHA) , there has been an increase in the volume of traffic which it has captured from the neighbouring countries because of the new incentives given to shippers and also because they are discovering the benefits of using Ghana's ports (2008). There has been an improvement in port and road infrastructure and facilities, which has been made known to shippers through marketing activities.

However, the second argument is valid even, since the road transport quality has been changing over the years and also there is the influence of the road distance between ports and LLCs.

5.3.4. Road and railways substitutes in the region

5.3.4.1. Inland waterways constraints

In some parts of the world, especially in Europe, rivers are being used in combination with other modes for the transport of maritime cargo. Mention could be made of the port of Basle in Switzerland, the river Seine, the river Ruhr. However, in West Africa, the use of these natural endowments is rather different. There are numerous rivers in West Africa, but yet, none of them connect ports to LLCs in a combined mode of transport system. This explains the predominance of the road transport and the rail transport as the major modes of transportation for LLCs' maritime transit cargo.

Rivers in West Africa are simply not suitable for the transportation of goods on a large scale. Not only are they shallow, but also they are located in a regional zone where rainfall patterns are inadequate and insufficient to maintain water level at all times and seasons. Moreover, they are exploited for the production of electricity in the region such as the case of the river Akonsombo in Ghana.

5.3.4.2. Air freight constraints

Air freight is an alternative mode of transport for transit cargo. The cargo concerns especially high value cargo (gold) and perishable goods (fresh vegetables fruits, and gems).

The fact is that freight using the air transport mode is carried by passenger aircraft. This situation results in additional handling costs, loss and damage to the cargo. Moreover, these aircraft are unreliable for the transportation of the cargo, because

aircraft earn more carrying passengers than cargo and hence, choose not to transport cargo whenever they have a choice.

Air France, the major international air carrier operating in the region, attaches great importance to the passenger demand and North-South bound cargo demand to mitigate their costs. However, this flow suffers from imbalances which explain also the high transportation cost observed for the transport of cargo by international aircraft.

Furthermore, due to the high transportation cost of freight by air and also the limitation of the carrying capacity of aircraft and facilities, this option of transporting LLCs maritime transit cargo could be seen as non-rational for shippers.

5.3.5. Impediments at the regional level

“Frankel (1997) tested for the effects of a common border, per capita GDP, a common language, and membership in regional trading arrangements, as well as economic scale and distance. Rose (2000) augmented Frankel’s model by introducing colonial ties, exchange rate volatility and a common currency. Soloaga and Winters (2001) provided a further control for effective distance, by introducing a measure of generalized remoteness from all potential trade partners” (Buys et al., 2006, p. 7) In the light of these ideas, it is relevant to analyze the existing main regional institutions in West Africa and to detect whether factors influencing the geography of trade might exist and thus influence the choice of shippers from LLCs.

5.3.5.1. Regional institutions

There are two main regional bodies in West Africa, namely the “Union Economique et Monétaire des Etats de l’Afrique de l’Ouest” (UEMOA) or West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

WAEMU, as was mentioned earlier, is made up of former French colonies in West Africa and is composed of Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo. Its mission is to enhance the competitiveness of the economic activities of its members on “a level playing field” market basis (UEMOA, 2008).

ECOWAS, instead, is made up of 15 countries including Cape Verde, Gambia, Guinea, Ghana, Liberia, Nigeria and Sierra Leone as well as all the cited members of the UEMOA. Its mission is “to promote economic integration in all fields of economic activity, particularly industry, transport, telecommunications, energy, agriculture, natural resources, commerce, monetary and financial questions, social and cultural matters” (ECOWAS, 2008).

All in all, these two main regional institutions aim at promoting economic integration and international trade but, the major differences between them lie on their language and currencies. In the light of the findings of Frankel and Rose, it could be argued that the likelihood for LLCs shippers to pass through a former French colony with which the country shares the same language and currency could be greater than passing through another country. Hence, the market share of Ghana and Nigeria might be influenced by the language factor, currency factor or simply the regional institution factor.

After a synoptic diagnosis, it appears that the main contributing factors are related to the quality and the quantity of the transport network in the region. This is particularly true and has been found by earlier researchers through more elaborate and focused studies. For instance Zhang (2008), in his paper presented at the International Transport Forum in 2008, treated competition between ports as competition between the alternates multimodal transport chains. The findings revealed that “when port compete in quantities, an increase in corridor capacity will increase own port’s

output, reduce the rival port's output, and increase own port's profit. On the other hand, an increase in inland road capacity may or may not increase own port's profit, owing to various offsetting effects"(Zhang, 2008, p. 24).

Road access conditions or road transport quality in addition to distance, have been found earlier as a contributing factor for ports selection decisions for shippers from LLCs. Therefore, for a more comprehensive analysis, these factors have been considered for further analysis.

5.4. Influence of distance and road services on port competition

Road transport quality here is considered as the result of roadblocks and unofficial fees (bribes) incurred by shippers during the transit of their goods.

5.4.1. Defining the variables

Indeed, a rational shipper will always be concerned with the minimization of his/her total cost (T_{it}) when selecting a port. This total cost includes the cost incurred for the reception or delivery of the goods in the ports (P_{it}) as well as the transit cost (T_{lit}) during the transit from the port to the final destination or vice versa. Meanwhile, the transit cost is made up of the land-based transport cost and what Graham (2007) refers to as avoidable costs, which consist of delay costs and illegal fees.

The total cost per unit of goods for the shipper is a function of the port-based costs and the land transport based costs

$$T_{it} = (P_{it}, T_{lit})$$

Where T_{it} : the total cost for goods to be received/delivered to/from the port i

P_{it} : the costs incurred at the reception/delivery at the port i

T_{lit} : the costs related to the transit transport to/from the port i

$i = (1, 2, 3, \dots, 5)$

5.4.2. Effect of distance on land transport based costs

As a result of a lack of organization of the transportation services, the transportation cost in West Africa has an erratic trend characteristic (Luguye, 2004, p. 31). Therefore, reliable information is difficult to gather for comparison purposes. Moreover, due to the lack of relevant information on the transportation cost, the cost provided by Delmas (a major operator in the region) serves as the base for analysis in this paper (See Table 5-8 & Table 5-9). However, the influence of the distance on the delay cost and bribes has been assessed based on Table 5-9.

Table 5-8: Road transit transport cost for containers (maximum 28 tons in 40')

Road	Distance (km)	Total cost (€)
Tema-Ouagadougou	1040	2567
Lome-Ouagadougou	990	2537
Tema-Bobo Dioulasso	1395	3018
Lome-Bobo Dioulasso	1345	2704
Tema-Niamey	1234	3290
Lome-Niamey	1200	3184
Tema-Bamako	1840	4120
Lome-Bamako	1790	4073

Source: Delmas BLD tariff derived from (Luguye, 2004, p. 32)

Table 5-9: Delay costs and bribes by selected corridor

Corridor	Distance (Km)	Delay cost (€)	Bribes (€)
Togo corridor	746	5.21	16.09
Ghana corridor	808	7.40	21.88
Togo corridor	746	1.63	17.52
Ghana corridor	808	5.99	14.82

Source: derived from Appendices C- 1 and C- 3 (*Appendix C- 2 was not considered, since the results were influenced by instructions given to drivers by the surveyors*)

The influence of the distance on the transport cost, delay cost (d_{it}) and bribes (b_{it}) is shown in Tables 5-10 and 5-11 respectively.

Table 5-10: Correlation between distance and transport costs

	Distance	Transport cost
Distance	1	0.9099

Table 5-11: Correlation coefficient between distance, delay costs and bribes

	Distance	Delay cost	Bribes
Distance	1	0.7696	0.2902

Definitely, distance has a positive impact on the transport cost, delay cost, as well as the bribes.

The computation of the result yields the transportation cost and delay costs as a function of distance. Bribes collected from drivers seem not to be influenced by the distance and vary from one country to another.

$$t_{it} = t_{it}(x_{it})$$

$$d_{it} = d_{it}(x_{it})$$

$$t_{it} = 1.8021 x_{it} + 746.13 \quad (7)$$

$$d_{it} = 0.0529i x_{it} - 36.044 \quad (8)$$

$$i = (1,2,3,..,5)$$

In turn, the total cost T_{it} becomes:

$$T_{it} = P_{it} + T_{lit}$$

$$T_{lit} = t_{it} + d_{it} + b_{it}$$

$$(7)+(8) \rightarrow \rho_{it} = 1.855 x_i + 710.086 \quad (9)$$

$$T_{lit} = \rho_{it} + b_{it} \quad (10)$$

$$T_{lit} = 1.855 x_i + 710.086 + b_{it} \quad (11)$$

$$\partial T_{lit} / \partial x_{it} = 1.855 > 0 \quad (12)$$

$$\partial T_{lit} / \partial b_{it} = 1 > 0 \quad (13)$$

The interpretation of the inequalities (12) and (13) is that a decrease of the distance will lead to a fall in the transit cost and an increase of the bribes collected from truck drivers will lead to an increase of the land transport based cost.

Consequently, a rational shipper in his/her port selection decision will think of minimizing T_{it} , and minimizing it is equivalent to minimizing simultaneously both the land transport based cost T_{lit} and the port-based cost P_{it} . Therefore, different observable cases are possible.

- a- T_{lit} minimized and P_{it} minimized
- b- T_{lit} not minimized but P_{it} is minimized
- c- T_{lit} minimized but P_{it} not minimized
- d- T_{lit} not minimized and P_{it} not minimized

Faced with the situation a- and c-, a shipper from a LLC has a clear idea of the port to be selected among the five alternative ports in the West African sub-region. The situation a- is obviously the best for him/her.

Minimizing P_{it} is not obvious for shippers. This is, because, information on port-based costs in the region is difficult to get, it varying from country to country and also from commodity to commodity (Luguye, 2004, p. 28). On the other hand, the situation in b- and c- does not allow a clear view as to whether the total cost is minimized or not, since the gain allowed by the minimization of P_{it} can offset the

non-minimization of land transport based cost and vice-versa and consequently, lead to the minimization of the total transit cost for the shipper.

In theory, the idea of minimization of the total transit cost is understandable, but in practice it is not, more especially when shippers lack information on the costs that they have to incur related to the reception/delivery of their goods to the ports and their transit cost. These costs are not only affected by economic trends but also vary from one country to another.

Shippers in their port selection decisions have to be kept abreast of their gain when passing through a port as compared to others. The only way for a port to be a winner in this competitive environment is its marketing activities.

Competition among rival ports in West Africa is, therefore, affected to some extent by hinterland access conditions to ports. Road transport is the major transport means in the sub-region and has been considered.

The improvement of the road access condition would definitely contribute to the minimization of the land-based costs whereas the improvement of port efficiency would lead to a minimization of port-based cost.

The port access condition would only be improved through the promotion and proper implementation of the trade facilitation measures encouraged by UNCTAD and other international organizations. It also goes along with the promotion of the transportation network. Meanwhile, the improvement of port efficiency will be gradually achieved through the promotion of port developments (adequate and sufficient infrastructures and handling equipments).

5.5. Indirect contributing factors

According to the UNCTAD Trade and Logistic Branch SITE :

Access to markets through efficient and cost-effective transport services is a basic pre-condition for developing countries to participate in international trade and globalized production processes. The “New Geography of Trade”, i.e. the increased participation of developing countries in merchandise exports and the growth of South-South trade, would not be possible without global shipping networks, port reforms and investments in transport infrastructure as well as trade and transport facilitation (UNCTAD Trade Logistics Branch, 2006, p. 14).

Hence, ports in West Africa will benefit from the growth of trade generated by shippers of LLCs enabled by such shipping networks, port reforms and investments in transport infrastructure as well as trade and transport facilitation. An analytical deduction will lead to the idea that previously mentioned enablers are somehow contributing factors to the increase of maritime traffic for the benefit of regional ports.

It is, therefore, important to have a focus on those determinants of the trade, port traffic demand and indirectly LLC shipper’s port selection.

5.5.1. Shipping network

The Liner Shipping Connectivity Index (LSCI) characterizes very well how good the connections the countries have with shipping lines. West African country rankings were not better than 59th, the highest ranking recorded by Ghana in 2006. However, these countries face numerous challenges before any improvement can be made.

Supply follows demand in principle, but in shipping the picture is different and consists of a duality: “Supply follows demand” and “demand follows supply” as well. In West Africa, the trade imbalance between imports and exports of goods is very challenging for the shipping lines. Low volumes of export cargo and port inefficiency have negative repercussions on the maritime transportation cost, which

in turn impacts on the volume of both imports and exports creating, therefore, a vicious circle in which West African countries are trapped. (Pálsson et al., 2007, p. xiii).

There is a need for the improvement of the maritime connectivity of West African ports, which goes along with appropriate and sufficient port services and infrastructures development, efficient information and communication technology, adequate hinterland connections as well as inter- and intra-port competition (Pálsson et al., 2007, p. xiii; UNCTAD Trade and Development Board, 2007, p. 7).

5.5.2. Port services and infrastructures

Due to port inefficiency in West Africa as a result of insufficient or lack of adequate equipment, shipping lines often face an increase in their turnaround time and consequently, in their costs. These costs are either due to congestion or low port productivity and are passed on to the shippers. For instance, From 21 May 2008 onward, the congestion cost by unit of container set by the liner shipping conference operating in the region ranged from 50 to 125 Euros and the congestion surcharges that were applied between 21 July and 21 September 2006 reached a maximum of 850 Euros for the Port of Lagos (both for Apapa and Can Tin Island).

To reduce these costs, there is a need for West African ports to improve their infrastructure and their cargo handling performances. The recent port privatizations that have occurred in the region are expected to help to achieve such improvement.

Furthermore, it has been stated earlier that ports in the region have limitations in accommodating larger vessels, which would enable the benefit of economies of scale for both shipping lines and shippers. This fact represents a challenge for these ports in the future if account is taken of the year by year increasing traffic. Pálsson and his co-authors predicted that in five to ten years time 2500-4000 TEUs container vessels requiring up to 14m draught will be calling at West African ports (2007, p. 20).

Since there are multiple ports along the West African coast, improving port connectivity for shipping lines could be enhanced by the affirmation of one port as a transshipment port in the region.

5.5.3. Transshipment port in the region

There are some projects of extension going on in different ports of the region notably, in Abidjan, Cotonou, Lagos, Lomé and Tema, but their concretization is taking time. One of the large projects is that in Abidjan.

Abidjan has announced the huge project of “Ile de Boulay” or Boulay Island, a bare area of 2000 ha, owned by the port of Abidjan. The first quay, comprising two or three berths (600m) with 15m draught is expected to be put into service by 2010. At the completion of the project, Boulay Island will be a veritable transshipment port and industrial center linked to the northern highway through Yopougon city by an adequate road connection. Meanwhile, Vridi container terminal will be extended and adequately equipped (Port Autonome d'Abidjan).

It is worth noting that ports in the region are striving not to remain marginal as regards the new trend related to the hub and spoke system. Following the dual principle of “supply follows demand” and “demand follows supply”, the competing ports for such a project will be those having substantial exporting cargoes. But will a transshipment port in the region lead to a substantial benefit for the shippers?

A study realized by Pálsson in 1998 related to the benefit of a hub and spoke system compared to a system of multiple port calls in West Africa resulted in interesting findings. It was shown that the hub and spoke system would enable carriers' cost reduction thanks to economies of scale. However, the only port to benefit will be the hub port as the maritime transportation cost to and from that port will drop by nearly half. However, it is not a cost-effective solution for shippers in general (including shippers from all other ports) who will not necessarily benefit from the low cost

induced by the economies of scale. However, the hub might win the competition over LLCs shippers' traffic since those shippers would rather take the advantage of the low maritime transportation cost (Pálsson, 1998, pp. 8, 16).

The promotion of inter- and intra-port competition will be achieved through port reforms, investments in transport infrastructure as well as trade and transport facilitation. Definitely, these factors are prerequisites for the success of a transshipment port in the region. Pálsson has indicated that:

An immediate action would be to incrementally build a commercially friendly transportation environment, country by country, port by port. This effective way of lowering the total logistics cost of the region will require, inter alia, changes in policies, processes, and procedures, and improved management, such that a reasonable balance between administrative necessities and commercial friendliness is achieved. It requires focusing on the practices of current operations; greatly improving efficiency of customs and rationalizing its practices, increasing significantly productivity of the ports through container lifts and speedy handling service, and a serious effort to weed out corruption (1998, p. 16)

5.5.4. Legal and Institutional framework

5.5.4.1. Legal framework

The international community, conscious of the geographical disadvantages of LLCs, has adopted some regulations in order to help these countries to have access to seaports when transiting their goods through CCs located in their neighborhood. These legal instruments include the Convention and Statute on Freedom of Transit, 1921; the General Agreement on Tariffs and Trade (GATT), 1947, now part of GATT 1994, the Convention on Transit Trade of Land-Locked States, 1965, and the United Nations Convention on the Law of the Sea, 1982. Moreover, the Almaty

Program Action was adopted to complete the lists. This program, in fact, has the objective to reinforce cooperation between LLCs and Transit Corridors.

These instruments have been ratified by some members of ECOWAS, but not by all. Even member countries concerned with the transit trade have failed to adhere to these instruments (N'Guessan, 2003, p. 9). However, at the regional level the conventions governing the transport and transit facilitation (TIE and TIR convention as well as ECOWAS “Carte Brune”) are suffering from their lack of proper implementation. As a matter a fact, a study conducted by WAEMU in 1998 related to the TIR and TIE conventions revealed that 70% of the rules covering transit and transport in the union are based on bilateral agreements or national regulations rather than on the multilateral conventions (N'Guessan, 2003, p. 29).

5.5.4.2. Institutional framework

The institutional framework consists of government bodies, customs authorities, port authorities, shippers’ councils, clearing and forwarding agents, road and rail haulage companies, insurance companies, and the banking industry.

Delays and various illegal fees collected from drivers and truckers are mainly due to the customs procedures and documentation, which can be described as cumbersome and the improper organization of haulage companies as well as the freight forwarder profession. Customs procedures are cumbersome due to the fact that there is no procedure for harmonization between the different countries in the region.

5.6. A Commercially friendly transportation environment

An early analysis of the road and railway conditions has helped to diagnose their poor condition as well as their insufficiency. The promotion of inter- and intra-port competition goes along with the promotion of the transportation network. It will only be effective if there is good will from the side of the coastal countries. However, it could be contended that since countries invest using taxpayers’ money, it would be

judicious for the regional unions ECOWAS and WAEMU to give their support to the achievement of such projects for the benefit of the whole community. Therefore, transport and trade facilitation should be the fruit of bi- or multilateral agreements.

By and large, numerous factors that determine LLC shippers' port selection have been identified. They include road and railway transport quality and port facilities as well as the CCs connectivity to shipping lines.

Chapter 6: Conclusion and recommendations

This chapter aims at summarizing the studies that have been carried out in this paper and at suggesting some recommendations. The main objective of this research is to contribute by reviewing maritime transportation in West Africa to the better understanding of the competition level in the region, to assess the competition level in the region in order to raise the different stakeholders' awareness as regards to the necessity of promoting competition and to investigate the influential qualitative factors that might influence LLC shippers' port selection decisions.

6.1. Main purpose of the research

To attain the objectives mentioned above, the following chapters have covered:

- An Overview of port competition and marketing concepts
- A review of maritime transport and port services in West Africa
- An assessment of competition levels in the sub region
- An analysis of the factors influencing LLC shippers' port selection decisions

Chapter 2 thoroughly examined the port competition and port marketing concepts and discovered with certainty that port competition as a result of liberalization, privatization and deregulation phenomena is a reality today. Port competition is becoming fiercer and fiercer. Therefore, there is a need for ports to adjust to the new environment. They need to enhance their competitiveness in order to attain their objectives and to sustain their development. Thus, marketing defined as one means used by ports to attain, retain and maintain customers, has become of great concern and importance to ports. Marketing aims at helping them to capitalize on their

distinctive organizational capabilities and to achieve competitive advantage and the greater their marketing capability, the greater their performance.

Chapter 3 relates to the analysis of the market structure of the West African sub-region based on quantitative and qualitative information. Moreover, it paves the road for the achievement of the objectives of the following chapter. It sheds light on the process of the assessment of the competition level in the region, defines the methods or tools to be used and also gives wide statistical data on the different ports studied. Qualitative information is mainly concerned with the concentration of the shipping lines and terminal operators.

The Assessment of port competition in the sub-region has been possible based on the information presented in chapter 3. Interesting results have been found. Similarly to other parts of the world, containerization in West Africa is growing faster than the growth of the GDP. An increase of 1% in the GDP of the corresponding group of countries (Studied West African Countries i.e. both CCs and LLCs) has led to an increase in the container traffic, total port traffic national traffic, and transit traffic of respectively 2.51; 1.80; 1.84; 2.50 per cent. This traffic is generated by the SWACs, like the traffic in Africa in general is characterized by imbalances in terms of cargo loaded and unloaded, imports and exports by value, and containers loaded and unloaded.

The analysis of the traffic structure of ports has shown that the national traffic accounts for more than 80% of the total traffic in three of the studied West African ports. The remaining two ports' national traffic represents more than 50% of their total traffic. Therefore, similar to many ports in the world (such as ports in Europe), ports in West Africa are not in a monopolistic situation as regard to their local traffic. However, they still have a great competitive advantage over this particular market. Only the transshipment traffic and LLCs transit traffic are subject to competition, but

it is important to highlight the embryonic state of the transshipment business in the region due to the physical limitations of ports.

It has been found also that there is still a great concentration of container traffic, notably in Abidjan port and in Ghana, even if the Herfindahl index has decreased over the years as compared to the year 2000.

Port competition over LLCs' transit traffic is fierce. Apart from Dakar port, which is not present in all the 3 LLCs' markets, all the other ports are striving hard to get customers from these markets.

A comparison with some Chinese ports has revealed that West African ports are not efficient. Moreover, due to the poor condition and the insufficiency of the transportation network, local shippers prefer to ship their goods through their countries instead of neighboring CCs. This situation explains the quasi monopoly of ports over their local traffic. Meanwhile, shippers are much influenced in their port selection decision by other factors rather than port efficiency.

One of the factors that influence their decision is the distance. This has been proved by a linear correlation analysis. The longer the distance, the lower LLC shippers' transit traffic demand. Furthermore, other determinants of their demand for port services have been identified, including the road and railway transportation condition or quality. The road quality, especially, includes the road condition, number of roadblocks, illegal fees incurred, bribes, delays and regional union effects (i.e. use of identical currency and linguistic ties).

6.2. Recommendations

Ports in West Africa are not efficient. This situation is coupled with the poor condition and the insufficiency of the transportation network. Hence, local shippers prefer to ship their goods through their own countries instead of neighboring CCs.

This is the reason which explains the competitive advantage a port has over its local traffic as compared to the other regional ports. On the other hand, LLCs shippers are influenced much more by other qualitative factors, including road transport quality and efficiency. Therefore, the promotion of port competition could only be enhanced through the promotion of trade facilitation.

So far, international organisations such as the World Bank, UNCTAD, the United States Agency International Development (USAID) and the African Development Bank (AfDB) have been promoting trade facilitation through different projects to help cut down the high logistical costs. Moreover, at the regional level, many treaties and agreements have been concluded, but still a lot of effort has to be made to implement them. CARANA Corporation has reviewed some of the areas to be tackled.

According to the CARANA Corporation, one of the key elements for the improvement of the trade competition is the improvement of trade facilitation, which could be enhanced starting with the enforcement of transport regulations. Another point is the promotion of the development of logistics supply chains, which have to do with the promotion of both the road and railway networks since the existing ones have seriously deteriorated and are obsolete. In addition, the implementation of regional treaties would enable the reduction of informal payments and customs encumbrances and help in deterring corruption and bribes and improving, therefore, the road transport quality. Even if the Road Quality Index elaborated by Buys et al (2006), is different for each West African country, the overall situation remains bad. Above all, honouring regional treaties and the development of road and railway connections to LLCs will help in promoting port competition in the region. The only way to succeed in this task requires willingness from both individual countries and regional communities including the ECOWAS as well as the WAEMU.

The result of the promotion of the road transport network and trade facilitation will certainly contribute to the erosion of the role played by the distance in shippers' decisions, especially the decisions of LLCs to the benefit of the role played by efficiency. The most influential factor on LLC shippers' decisions, therefore, will be port efficiency, a factor that has been identified and confirmed by many researchers. But yet, this will be fulfilled if the countries in the region are not subject to the occurrences of socio-political crisis³, war⁴ and act of god⁵.under the strict condition of a stable socio-political environment in the region. For instance, a shift has been experienced of LLCs transit traffic from Côte d'Ivoire to other regional ports during the recent socio-political crisis. This was also the case of Chad as regards Nigerian ports during the Biafra war.

³ Socio-political crisis such as the recent crisis Cote d'Ivoire

⁴ An example is the Biafra war that has led to the shift of Chad Traffic from Nigeria to other countries especially Cameroun.

⁵ An example is the recent floods in Togo in July 2008, which resulted in the collapse of bridges along the corridor linking Lomé port to Burkina-Faso

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Appendix A: Demand of maritime transportation

Appendix A- 1: Origin of African Imports: 2004-2006

Value	Period	Market Origin of Import to Africa					
		World	Europe	North America	U.S	South & Central America	*CIS
billion of dollars	2004	229.91	92.32	44.81	6.98	39.67	0.69
	2005	299.54	115.79	64.6	9.18	57.4	0.97
	2006	363.29	131.56	79.8	11.33	71.12	1.45
	2004-2006	297.58	113.22	63.07	9.16	56.06	1.04
Percentage	2004	100.00	40.15	19.49	3.04	17.25	0.30
	2005	100.00	50.36	28.10	3.99	24.97	0.42
	2006	100.00	57.22	34.71	4.93	30.93	0.63
	2004-2006	100.00	49.25	27.43	3.99	24.38	0.45

Source: WTO International Trade Statistics 2007, Appendix Tables A2 and A6

Appendix A- 2: Destination of African exports

Value	Period	Market destination for African Export						
		World	Europe	North America	U.S	Sth & Central America	*CIS	Asia
Billion of dollars	2004	46.65	20.07	3.48	3.18	1.15	0.02	11.86
	2005	56.39	23.19	4.36	3.89	2.09	0.05	14.89
	2006	68.12	25.63	5.21	4.47	2.77	0.04	20.40
	2004-2006	57.05	22.96	4.35	3.85	2.00	0.04	15.72
Percentage	2004	100.00	43.02	7.46	6.82	2.47	0.04	25.42
	2005	100.00	41.12	7.73	6.90	3.71	0.09	26.41
	2006	100.00	37.62	7.65	4.47	4.07	0.06	29.95
	2004-2006	100.00	40.59	7.61	6.06	3.41	0.06	27.26

Source: WTO International Trade Statistics 2007, Appendix Tables A2 and A6

Appendix A- 3: West African imports of merchandises: 2000-2006

Country	Import of merchandises (million dollars)						
	2000	2001	2002	2003	2004	2005	2006
Benin	613	623	725	892	894	894	990
Burkina-Faso	611	656	739	925	1270	1280	1450
Cote d'Ivoire	2785	2418	2456	3231	4291	5350	5310
Ghana	2973	3154	2720	3210	4074	5755	5497
Mali	806	990	928	1271	1364	1266	1860
Niger	395	412	468	622	750	805	950
Senegal	1519	1730	1958	2391	2849	3197	3434
Togo	562	553	591	775	880	1000	1100
Total (SWACs)	12264	12537	12587	15320	18376	21552	22597
Annual Average change (%) 2000-2004					0.11		

Source: WTO International Trade Statistics 2007, Appendix Table A6, A7

Appendix A- 4: West African exports of merchandises: 2000-2006

Country	Export of merchandises (million dollars)						
	2000	2001	2002	2003	2004	2005	2006
Benin	392	374	448	541	568	569	560
Burkina-Faso	209	223	247	321	479	347	440
Cote d'Ivoire	3888	3946	5275	5788	6919	7488	8420
Ghana	1671	1716	1850	2324	2450	2803	3703
Mali	454	725	874	928	977	1135	1350
Niger	283	272	279	352	437	500	540
Senegal	920	1003	1067	1257	1509	1536	1550
Togo	363	357	427	598	601	586	617
Total (SWACs)	8180	8616	10467	12109	13940	14964	17180
Annual Average change (%) 2000-2004					0.14		

Source: WTO International Trade Statistics 2007, Appendix Table A6, A7

Appendix A- 5: World Container traffic by region (in millions TEUs)

Country group	2001	2002	2003	2004	2005	Average change 2003-2004 (%)
Europe	51	57	60	64	69	6.67
Asia	115	134	152	177	199	16.45
North America	30	33	36	38	41	5.56
Africa	-	-	9.66	11.24	-	16.33
Rest of the World	41	42	44	49	52	11.36
Total	244	299	337	357	388	5.88
World annual growth	5.2	9.2	8.2	12.6	10.3	-
Percentage of the world container traffic (%)						
Europe	20.92	19.05	17.81	17.94	17.80	-
Asia	47.17	44.77	45.12	49.62	51.33	-
North America	12.30	11.03	10.69	10.65	10.58	-
Africa	-	-	2.87	3.15	-	-
Rest of the World	16.82	14.03	13.06	13.74	13.41	-
Total	100.00	100.00	100.00	100.00	100.00	-

Source: Conte (2005) derived from (Pálsson et al., 2007, p. 34)

Appendix B: Port performances

Appendix B- 1: Abidjan Port traffic: 2000-2006

Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Burkina-Faso	383925	436207	388993	15184	162077	304253	298309	284135
Mali	549556	539168	637646	176629	251958	285854	399580	405770
Niger	1196	1539	1817	110	103	102	16	698
Others	10294	26264	21725	1252	6861	1651	1449	9928
Transit (1)	944971	1003178	1050181	193175	420999	591860	699354	700531
National (2)	13611443	14641767	13806831	14340121	16212085	16944962	16924488	15211671
(1)+(2)	14556414	15644945	14857012	14533296	16633084	17536822	17623842	15912202
Transshipment (3)	748901	2137660	1956713	2446093	2687977	2086822	1491121	1936470
(1)+(2)+(3)	15305315	17782605	16813725	16979389	19321061	19623644	19114963	17848672

Source: Retrieved from the Website of “Port Autonome d’Abidjan” <http://www.paa-ci.org/>

Appendix B- 2: Cotonou Port traffic: 2000-2006

Cotonou port traffic (in tonnes)								
Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Burkina-Faso	5170	5170	14437	37215	25265	105785	126872	45702
Mali	15307	15307	28727	13976	424	41978	50346	23724
Niger	419685	419685	513626	799907	671446	1041253	1248819	730632
Others	566738	566738	498758	390585	9013766	852055	1021906	1844364
Transit (1)	1006900	1006900	1055548	1241683	9710901	2041071	2447943	2644421
National (2)	2228976	2302990	2414364	3048507	2727137	3111788	3550692	2769208
(1)+(2)	3235876	3309890	3469912	4290190	12438038	5152859	5998636	5413629
Transshipment (3)	-	-	-	-	-	-	-	-
(1)+(2)+(3)	3235876	3309890	3469912	4290190	12438038	5152859	5998636	5413629

Source: Retrieved from the website of “Port Autonome de Cotonou”

Appendix B- 3: Dakar Port traffic: 2000-2006

Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Burkina-Faso	-	-	-	-	-	-	-	-
Mali	195000	210000	340000	652778	527729	402229	543527	410180
Niger	-	-	-	-	-	-	-	-
Others	39390	49485	62169	78103	98120	123269	95623	78023
Transit (1)	234390	259485	402169	730881	625849	525498	639150	488203
National (2)	6679653	6932543	7195006	7467407	7750121	8043538	6814322	7268941
(1)+(2)	6914043	7192028	7597175	8198288	8375970	8569036	7453472	7757144
Transshipment (3)	335624	421645	529714	665482	836047	1050328	818282	665303
(1)+(2)+(3)	7249667	7613673	8126889	8863770	9212017	9619364	8271754	8422448

Source: Provided by Statistics department of “Port Autonome de Dakar”

Figures in italics have been forecasted based on various assumptions considering market trend in Senegal and the region (See Appendix B- 4 Error! Not a valid bookmark self-reference. for details)

Appendix B- 4: Generation of the traffic of the Port of Dakar: 2000-2004

Traffic type	2000	2001	2002	2003	2004	2005	2006	2007	Average 2000-2007
National (1)	6679653	6932543	7195006	7467407	7750121	8043538	6814322	8371665	7406782
Mali	195000	210000	340000	652778	527729	402229	543527	-	410180
Others	39390	49485	62169	78103	98120	123269	95623	113338	82437
Total transit	234390	259485	402169	730881	625849	525498	639150	699918	514667
Total (1)+(2)	6914043	7192028	7597175	8198288	8375970	8569036	7453472	9071583	7921449
Transshipme	354969	445949	560247	703840	884236	1110868	903082	779460	717831
General tota	7269012	7637977	8157422	8902127	9260206	9679904	8356554	9851043	8639281
Changes (%)									
National (1)	-	-	-	-	-	-	-0.15	0.23	0.04
Mali	-	0.08	0.62	0.92	-0.19	-0.24	0.35	-	0.26
Others	-	-	-	-	-	-	-0.22	0.19	-0.02
Total transit	-	-	-	-	-	-	0.22	0.10	0.16
Total (1)+(2)	-	-	-	-	-	-	-0.13	0.22	0.04
National	-	-	-	-	-	-	-0.19	-0.14	-0.16
General total	-	-	-	-	-	-	-0.14	0.18	0.02

The traffic over the period 2000-2004 (in the above table) are yielded based on the following assumptions.

Account has also been taken of the not only the trend in Senegal, but also in other ports of the region, especially in Côte d'Ivoire. The assumptions are the following:

- 1- The annual average change of the national traffic over the period 2000-2004 is similar to that over the period 2005-2007
- 2- The annual average increase in the transit traffic is similar to that of the Malian traffic over the period 2000-2004
- 3- The annual average change in the transshipment traffic over the period 2000-2004 is similar to that of over the period 2005-200

Appendix B- 5: Lomé Port traffic: 2000-2006

Lome port traffic (in tonnes)								
Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2001-2006
Burkina-Faso	283392	276360	384908	702694	577408	618033	588526	524655
Mali	11665	17067	52901	220564	138077	123623	125248	112913
Niger	110731	134593	170509	174986	180248	143872	151278	159248
Others	155574	296262	96567	114671	139902	246604	310894	200817
Transit (1)	561362	724282	704885	1212915	1035635	1132132	1175946	997633
National (2)	2080323	2202232	3185049	3133531	3206818	3719864	3921852	3228224
(1)+(2)	2641685	2926514	3889934	4346446	4242453	4851996	5097798	4225857
Transshipment (3)	13748	42910	86121	220958	186892	228037	251397	169386
(1)+(2)+(3)	2655433	2969424	3976055	4567404	4429345	5080033	5349195	4395243

Source: Provided by Statistics department of "Port Autonome de Lomé"

Appendix B- 6: Tema Port traffic: 2000-2006

Tema port traffic (in tonnes)								
Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Burkina-Faso	42140	78063	208948	329530	363712	427918	497584	278271
Mali	256	38279	144276	423147	276794	287843	243430	202004
Niger	76303	116151	159680	77891	87110	150987	141203	115618
Others	26274	28758	114869	24525	36512	8577	5373	34984
Transit (1)	144973	261251	627773	855093	764128	875325	887590	630876
National (2)	6055027	6038749	6172227	6544907	7735872	8724675	7612411	6983410
(1)+(2)	6200000	6300000	6800000	7400000	8500000	9600000	8500000	7614286
Transshipment (3)	17715	38165	151233	138520	71082	155815	339841	130339
(1)+(2)+(3)	6217715	6338165	6951233	7538520	8571082	9755815	8839841	7744624

Source: Ghana Ports and Harbour Authority website

Appendix B- 7: SWAPs container throughput: 2000-2006

SWACs container throughput (in number of TEUs)								
Port	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Abidjan	434654	543845	579055	600829	669843	571674	507119	558146
Cotonou	81862	89168	91994	98188	97801	158201	183574	114398
Dakar	<i>132221</i>	<i>156728</i>	<i>185777</i>	<i>220210</i>	<i>261024</i>	309404	375876	234463
Lome	<i>57763</i>	<i>75818</i>	99516	170115	182650	210886	276802	153364
Tema	206768	221468	270878	346981	385902	442082	425400	328497
Total	913268	1087027	1227220	1436323	1597220	1692247	1768771	1388868

Source: Compiled from various source including port authorities website

All the figures in italics in the appendix B- 7 are yielded based on the following assumptions:

- The change in 2006 is similar to the average annual change of the port of Cotonou over the period 2000-2005 equal to 16.04%

- The change in the traffic of the port of Dakar over the period 2000-2004 is similar to the average annual change over the period 2005-2006 equal to 18.53%
- The change in the traffic of the port of Lomé over the period 2000-2001 and in 2006 is similar to the average annual change over the period 2002-2005

Appendix B- 8: Selected port traffic and port usage factor: 2000-2006

Port	Quay length (m)	Selected port traffic per year (in tonnes)					
		2001	2002	2003	2004	2006	2001-2006
Abidjan	2920	17782605	16813725	16979389	19321061	19114963	18272565
Cotonou	1200	3309890	3469912	4290190	4325648	5998636	4424522
Dakar	4060	7613673	8126889	8863770	9212017	8271754	8617911
Lome	1077	2969424	3976055	4567404	4429345	5349195	4395243
Tema	2013	6338165	6951233	7538520	8571082	8839841	7999109
		Usage factor (port traffic in tonnes/total quay length in m)					
Abidjan		6089.93	5758.13	5814.86	6616.80	6546.22	6257.73
Cotonou		2758.24	2891.59	3575.16	3604.71	4998.86	3687.10
Dakar		1875.29	2001.70	2183.19	2268.97	2037.38	2122.64
Lome		2757.13	3691.79	4240.86	4112.67	4966.75	4081.01
Tema		3148.62	3453.17	3744.92	4257.86	4391.38	3973.73

Appendix B- 9: Total seaborne trade of SWAPs: 2000-2006

SWACs total seaborne trade (in tonnes)								
Traffic type	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Burkina-Faso	714627	795800	997286	1084623	1128462	1455989	1511291	1098297
Mali	771784	819821	1203550	1487094	1194982	1141527	1362131	1140127
Niger	607915	671968	845632	1052894	938907	1336214	1541316	999264
Others	798270	967507	794088	609136	1182771	1232156	1435245	1002739
Transit (1)	2892596	3255096	3840556	4233747	4445122	5165886	5849983	4240426
National (2)	30655422	32118281	32773477	34534473	37632033	40544827	38823764	35297468
(1)+(2)	33548018	35373377	36614033	38768220	42077155	45710713	44673748	39537895
Transshipment (3)	1115988	2640380	2723781	3471053	3781998	3521002	20266243	5360064
(1)+(2)+(3)	34664006	38013757	39337814	42239273	45859153	49231715	64939991	44897958

Appendix B- 10: SWAPs' market share in Burkina-Faso (%): 2000-2006

Market share in Burkina-Faso (%)								
Ports	2000	2001	2002	2003	2004	2005	2006	Average 2000-2006
Abidjan	53.72	54.81	39.01	1.40	14.36	20.90	19.74	29.13
Cotonou	0.72	0.65	1.45	3.43	2.24	7.27	8.39	3.45
Dakar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lome	39.66	34.73	38.60	64.79	51.17	42.45	38.94	44.33
Tema	5.90	9.81	20.95	30.38	32.23	29.39	32.92	23.08
Market	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Appendix B- 11: SWAPs' market share in Mali (%): 2000-2006

Ports	Market share in Mali							Average 2000-2006
	2000	2001	2002	2003	2004	2005	2006	
Abidjan	71.21	65.77	52.98	11.88	21.08	25.04	29.33	39.61
Cotonou	1.98	1.87	2.39	0.94	0.04	3.68	3.70	2.08
Dakar	25.27	25.62	28.25	43.90	44.16	35.24	39.90	34.62
Lome	1.51	2.08	4.40	14.83	11.55	10.83	9.20	7.77
Tema	0.03	4.67	11.99	28.45	23.16	25.22	17.87	15.91
Market	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Appendix B- 12: SWAPs' market share in Niger (%): 2000-2006

Ports	Market Share in Niger							Average 2000-2006
	2000	2001	2002	2003	2004	2005	2006	
Abidjan	0.20	0.23	0.21	0.01	0.01	0.01	0.00	0.07
Cotonou	69.04	62.46	60.74	75.97	71.51	77.93	81.02	73.12
Dakar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lome	18.21	20.03	20.16	16.62	19.20	10.77	9.81	15.24
Tema	12.55	17.29	18.88	7.40	9.28	11.30	9.16	11.57
Market	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Appendix B- 13: SWAPs' market share for the transshipment (%) 2000-2006

Ports	Transshipment market share							Average 2000-2006
	2000	2001	2002	2003	2004	2005	2006	
Abidjan	67.11	80.96	71.84	70.47	71.07	59.27	93.04	73.39
Cotonou	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dakar	30.07	15.97	19.45	19.17	22.11	29.83	4.04	20.09
Lome	1.23	1.63	3.16	6.37	4.94	6.48	1.24	3.58
Tema	1.59	1.45	5.55	3.99	1.88	4.43	1.68	2.94
Market	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Appendix B- 14: Concentration of the container traffic

Port	Market share (%)							
	2000	2001	2002	2003	2004	2005	2006	2002-2006
Abidjan	47.59	50.03	47.18	41.83	41.94	33.78	28.67	40.19
Cotonou	8.96	8.20	7.50	6.84	6.12	9.35	10.38	8.24
Dakar	14.48	14.42	15.14	15.33	16.34	18.28	21.25	16.88
Lome	6.32	6.97	8.11	11.84	11.44	12.46	15.65	11.04
Tema	22.64	20.37	22.07	24.16	24.16	26.12	24.05	23.65
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Port	Herfindhal Index							
	2000	2001	2002	2003	2004	2005	2006	2002-2006
Abidjan	0.23	0.25	0.22	0.17	0.18	0.11	0.08	0.16
Cotonou	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01
Dakar	0.02	0.02	0.02	0.02	0.03	0.03	0.05	0.03
Lome	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.01
Tema	0.05	0.04	0.05	0.06	0.06	0.07	0.06	0.06
Total	0.31	0.32	0.31	0.28	0.28	0.24	0.22	0.26

Appendix B- 15: Port traffic and usage factor (2001-2006)

Port	Quay length (m)	Selected port traffic per year (in tonnes)					
		2001	2002	2003	2004	2006	2001-2006
Abidjan	2920	17782605	16813725	16979389	19321061	19114963	18272565
Cotonou	1200	3309890	3469912	4290190	4325648	5998636	4424522
Dakar	4060	7613673	8126889	8863770	9212017	8271754	8617911
Lome	1077	2969424	3976055	4567404	4429345	5349195	4395243
Tema	2013	6338165	6951233	7538520	8571082	8839841	7999109

Port	Usage factor (port traffic in tonnes/total quay length in m)					
	2001	2002	2003	2004	2006	2001-2006
Abidjan	6089.93	5758.13	5814.86	6616.80	6546.22	6257.73
Cotonou	2758.24	2891.59	3575.16	3604.71	4998.86	3687.10
Dakar	1875.29	2001.70	2183.19	2268.97	2037.38	2122.64
Lome	2757.13	3691.79	4240.86	4112.67	4966.75	4081.01
Tema	3148.62	3453.17	3744.92	4257.86	4391.38	3973.73

Appendix C: Road transport quality

Appendix C- 1: IRTG results from October 2006 to May 2007

Country	Distance within each country (km)	Number of stops		Bribes (\$)		Delays per 100 km (min)	Total delays (min)	Minimum Delay cost (\$)	Maximum delays cost (\$)
		by country	per 100 km	by country	per 100 km				
Lome-Ouagadougou									
Togo	746.0	11.0	1.5	25.0	3.0	16.0	119.4	5.2	7.8
Burkina-Faso	274.0	7.0	2.5	26.0	9.0	22.0	60.3	2.6	3.9
Corridor	1020.0	18.0	4.0	51.0	12.0	38.0	179.6	7.8	11.8
Tema-Ouagadougou									
Ghana	808.0	18.0	2.0	34.0	4.0	21.0	169.7	7.4	11.1
Burkina-Faso	274.0	7.0	4.0	20.0	11.0	35.0	95.9	4.2	6.3
Corridor	1082.0	25.0	6.0	54.0	15.0	56.0	265.6	11.6	17.4
Ouagadougou-Bamako									
Ghana	488.0	5.0	1.0	37.0	8.0	15.0	73.2	3.2	4.8
Burkina-Faso	417.0	19.0	4.6	105.0	25.0	38.0	158.5	6.9	10.4
Corridor	905.0	24.0	5.6	142.0	33.0	53.0	231.7	10.1	15.2

Source: IRTG (2007) derived from <http://www.watradehub.com>

Appendix C- 2: IRTG results from May to October 2007

Country	Distance within each country (km)	Number of stops		Bribes (\$)		Delays per 100 km (min)	Total delays (min)	Minimum Delay cost (\$)	Maximum delays cost (\$)
		by country	per 100km	by country	per 100km				
Tema-Ouagadougou									
Ghana	808.0	13.0	1.6	23.0	2.9	50.0	404.0	17.6	26.4
Burkina-Faso	184.0	6.0	3.3	19.8	10.8	545.0	1002.8	43.7	65.6
Corridor	992.0	19.0	4.9	42.8	13.6	595.0	1406.8	61.4	92.0
Ouagadougou-Bamako									
Burkina-Faso	488.0	7.0	1.6	33.9	8.1	10.0	48.8	2.1	3.2
Mali	417.0	18.0	4.3	95.1	19.5	26.0	108.4	4.7	7.1
Corridor	905.0	25.0	5.9	128.9	27.6	36.0	157.2	6.9	10.3
Lome-Ouagadougou									
Togo	746.0	11.0	1.5	27.2	3.7	8.0	59.7	2.6	3.9
Burkina-Faso	274.0	4.0	1.5	14.1	5.2	6.0	16.4	0.7	1.1
Corridor	1020.0	15.0	3.0	41.4	8.8	14.0	76.1	3.3	5.0

Source: IRTG (2007) derived from <http://www.watradehub.com>

Appendix C- 3: IRTG results from October 27 to December 2007

Country	Distance within each country (km)	Number of stops		Bribes (\$)		Delays per 100 km (min)	Total delays (min)	Minimum Delay cost (\$)	Maximum delays cost (\$)
		by country	per 100 km	by country	per 100 km				
Bamako-Ouagadougou									
Mali	417.0	20.0	4.8	121.0	29.0	10.0	41.7	1.8	41.7
Burkina	488.0	4.0	0.8	31.0	6.0	6.0	29.3	1.3	29.3
Corridor	905.0	24.0	2.7	152.0	17.0	8.0	72.4	48.3	72.4
Lome-Ouagadougou									
Togo	746.0	11.0	1.5	69.0	9.0	5.0	37.3	1.6	37.3
Burkina	274.0	6.0	2.2	25.0	9.0	4.0	11.0	0.5	11.0
Corridor	1020.0	17.0	1.7	94.0	9.0	5.0	51.0	34.0	51.0
Tema-Ouagadougou									
Ghana	808.0	18.0	2.2	51.0	6.0	17.0	137.4	6.0	137.4
Burkina	184.0	6.0	3.3	14.0	8.0	9.0	16.6	0.7	16.6
Corridor	992.0	24.0	2.4	65.0	6.0	16.0	158.7	6.7	158.7

Source: IRTG (2007) derived from <http://www.watradehub.com>

NB : The minimum and maximum delay costs are based on the estimation of the World Bank presented by Graham (2007)