Intermodal Container Transport Logistics, To And From Nigerian Ports To Hinterland

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Abstract
Transportation system in Nigeria is predominantly uni-modal. It is estimated that over ninety per cent of containers and passengers are transported by road. The over-reliance on road transport for the conveyance of containers and people has contributed greatly to the deterioration of Nigeria’s roads and the attendant increase in road maintenance costs. Scholars have revealed that a single means of transport cannot adequately serve the transportation needs of the people living in urban centers, but are yet to be fully developed and integrated with the dominant road transport system. This paper examines the current transport challenges in the transport systems in the area and the wider Nigerian context and advocates for inter-modal transport system, that is, the blending of road, water and rail to facilitate easy movement of people and containers. The paper submits that the development of an efficient inter-modal transport system would minimize the frequent chaotic traffic congestion experienced by motorists from ports to hinterland.

Keywords: Intermodal, container transport, hinterlands, ports.
Introduction

BACKGROUND OF THE STUDY

Container transport is currently growing fast and will continue to develop in the near future. However, some problems such as the road congestion, and negative environmental impacts due to container trucking, and the low utilization of container capacity are making the container transport less efficient. To deal with these problems, several new concepts regarding hinterland transport operations are presented and implemented by many seaports. The majority of these concepts aim to develop possible strategies for improving the logistics in the intermodal hinterland container transport system based on customer demand cost efficiency and environmental impact and quality and shift the cargo flows away from the congested roads to other transport modes including the waterways and railways. One promising new concept for improving hinterland accessibility is cargo-driven intermodal transport, this concept may contribute to aforementioned problems by, e.g. improving the container weight capacity utilization and reducing the semi-loaded containers going the hinterland from the sea port. Further, a numerical case of container shipment between Lagos Port and Port Harcourt is presented to experiment with the model. Based on the outcomes of the model, several conclusions are drawn in this work. As one important conclusion, setting up an intermodal transport authority might be premature at this stage, but there is a need to set up a department under the freight division to focus on intermodal planning and monitor it, whereby the authority would gain more in-depth understanding of how to plan for intermodal movement and policy implementation in this green corridor.

Critical mass is not a problem in this corridor; however, the right strategy implementation might be essential for the future of intermodal.

Variations in freight movements occur as a result of technology and societal demand and the growth of e-business and globalization. Transport modes as a whole play an important role in the economic development of a nation. One of the main aspects that a nation has to consider is to ensure that the transport modes develop in line with the broad macro-economic objectives. Efficient intermodal points of cargo transfer such as ports, airports and inland transfer facilities have to be further developed. With the
significant growth of trade in the future, an efficient freight transport system needs to be developed. The need for sustainable environmental development also leads to a demand for transport system.

The Nigerian economy is growing at 3.5% per year and according to the Central Bank of Nigeria (CBN), annual average economic growth for the next fifteen years is expected to be 4.5%. One of the important effects of the positive economic development is the growth of international trade, of which 90% is seaborne trade.

Import and export volumes of maritime cargo are therefore expected to grow significantly. The total maritime cargo handled in 2020 was 76.7 million tons, of which the import volume was 60% and the export volume 40%. Lagos port complex, which is the main gateway to Nigeria, handled the largest volume of cargo.

**Problem Statements**

Container volumes are expected to increase dramatically over the next ten to fifteen years. It is therefore important to develop a logistically efficient and sustainable hinterland container transport system. Inefficiency and environmental aspects are major challenges for hinterland transport. One option might be to promote intermodal rail-road transportation, a solution that has become increasingly popular in many developed countries. There is currently a lack of knowledge of how a hinterland transport system for inland container movements in Nigeria should be developed in order to satisfy logistics demands from both customers and operators.

There is therefore a need for research into developing and evaluating successful intermodal hinterland container transport as an alternative solution for sustainable freight transport for inland container movements.

**Aim of the Research**

To develop possible strategies for improving the logistics in the intermodal hinterland container transport system based on customer demand, cost-efficiency, environmental impacts and quality.

**Objectives of the Research**

a) To analyze the current hinterland container transport system, including the customers, service providers and government agencies.
b) To analyze import and export customer demands and priorities regarding hinterland container transportation
c) To evaluate and compare existing and direct road haulage based solutions with intermodal hinterland container transport in a selected corridor
d) To discuss and propose strategies for implementation of large-scale intermodal systems’ logistics in Nigeria, including government transport policies and the need for institutional

Research Questions
1. What effect does the use of intermodal container transport logistics, to and from Nigerian ports to hinterland have on the availability of container?
2. What major challenge(s) confront the transportation of container to hinterland in Nigeria?
3. What strategies can effectively aid the management of container transportation from ports to hinterland in Nigeria?

Scope and Limitation of Research
Nigeria consists of two main lands: Southern region and Northern region. The research was conducted in Southern Nigeria.

Location of Nigeria
Nigeria is located on the west coast of Africa. It is bordered on the north by the Niger and Chad; on the east by Cameroon; on the west by the Benin; and is bounded on the south by the Gulf of Guinea and Equatorial Guinea. It has a total area of 923,766 square kilometers of which the land area consists of 910,768 square kilometers, while...
the balance of 13,000 square kilometers is water, with a total coastline of 853 kilometers.

LITERATURE
Logistics Quality factors for mode/carrier selection
2.1:1 General transport service quality factors
According to the Japanese term, quality equals “zero defects”. It means doing it right the first time. Crosby (1979) defines quality as conformance to requirements. Garvin (1983) looks at quality by counting the frequency of internal failures (failures observed before a product leaves the factory) and external failures (failures occurring at the installation point). GueB (2006) define quality of service as satisfying the requirements and expectations of the customers regarding the following factors:
a) The service satisfies customer demands
b) The service fulfills reliability and capacity requirements without failure for a determined period of time
c) The manufacturer and distributor response to service failures. When discussing service quality, three important findings by Lehtinen, Lewis and Booms are listed below:
a) Service quality is more difficult for the consumer to evaluate than product quality.
b) Service quality perceptions result from a comparison of consumer expectations with actual service performance
c) Quality evaluations are not based solely on the outcome of a service they also involve evaluation of the service process. Indicate ten determinants of perceived service quality, shown in Table 2.1:1. Some of the determinants overlap but they reflect a framework for the quality elements of any service. Gea et al (2006) used these quality determinants in their research work.

METHODS
Data for this study was extracted from annual statistics of operations of ports and terminals submitted by all terminal operators to Nigerian ports authorities (NPA). The data included both inward and outwards containers traffic in all the ports for 10 years between 2010 to 2020. The index considered was the number of twenty-foot equivalent unit (TEUs) containers handled by terminals within the period under consideration.
Current hinterland transport issues as highlighted from the preliminary service provider interviews

The various issues and challenges faced by hinterland container transport services are discussed below under three main headings: 1) efficiency issues 2) Management issues and 3) cost issues.

Efficiency issues

Road haulage efficiency problems are of major concern and became imminent after the liberalization of the road haulage industry in 1999, which allowed too many new operators to enter the market. Self-regulatory market driven functions were not able to control and influence the standard of operations in the industry. The resulting overcapacities led to many problems such as unhealthy competition, lack of focus on safety issues and less concern for the impact on the environment. The Logistics Road Map Study conducted by the Nigeria Logistics and Supply Chain Council (2009) (NLSC) indicated that only 70% of the trailers were fully utilized for normal operations.

According to the ICT inland terminal operator, the rail operator NRC was able to provide the required service in the corridor even though there were still some rail service quality issues. Delays and poor reliability of the rail service have been questioned by port operators and customers. Inland terminal inefficiency also affected the usage of rail as an alternative mode for hinterland container transport.

One of the biggest challenges is to have efficient equipment for container handling in intermodal transfers. Some equipment needs major repairs, which has a negative impact on the efficiency of the inland terminal. Lack of space is another factor that affects the efficiency of the terminal. For example, ICT has no more land if they decide to expand their services. Even though the utilization rate is only 60%, any expansion would require them to move to another location. However, this move is not supported by the current customers since it would increase pre- and post- haulage costs.

Management Issues

In the road haulage sector, the professionalism of the staff is also of major importance. The operators focus specifically on the drivers’ performance,
behavior and acceptance of new operational ideas. There is a need for appropriate training modules to enhance and improve drivers’ performance. Another important issue is the high turnover of drivers caused by the large number of road haulage operators making it easier for drivers to find work elsewhere.

The ICT inland terminal also faces difficulties in marketing their services. Even though they would be able to offer customers more competitive rates, they might not be able to enjoy such benefits. This is due to the role of freight forwarding agents as intermediaries between the customers (manufacturers) and the inland terminal operators. There is a risk that the benefits offered by the operators would only give the freight forwarding agents larger profit margins. The coordination between the road and rail in intermodal transport chains is seen as a major management problem. The sole rail operator NRC mainly uses four logistics operators and is reluctant to use any other. Intermodal transport requires the willingness of operators involved to coordinate their activities in each corridor.

The current separate road and rail acts make it difficult to integrate different actors for the implementation of intermodal solutions.

**Cost factors**

Unless the customers (manufacturers) have railway sidings at their factories, rail or intermodal transport requires additional handling at inland terminals. This leads to extra costs and time in comparison to direct road haulage from port to end customer. However, the customers (manufacturers) might overlook the higher capacity and lower link haulage costs that intermodal might offer, particularly for longer distances between customer and port. Road haulage rates are currently low because of overcapacity, making it difficult for some of them to survive. In order to compensate the losses in the haulage business, some operators provide total logistics services and gain some revenue from the freight forwarding charges. This has become a common trend in the industry.

**STRATEGY AND IMPLEMENTATION**

**Need for attractive intermodal logistics solutions**

In the previous chapters the following facts and issues have been identified:
A very fast growth of container volume is expected in Lagos Port as well as in other Nigerian ports. Lagos Port volume is expected to increase from 6.1 in 2011 to 7.9 million TEUs in 2020 and 10.2 million TEUs in 2030.

The intermodal share of hinterland container transport to and from Lagos Port has decreased considerably despite available capacity. In 2010, only 30% of the Lagos Port volume used intermodal. In 2020, the container volume from Port Harcourt to Warn is expected to be 318,000 TEUs and in 2030 407,040 TEUs. With the increasing volume, intermodal share will continue to decrease if the service levels remain unchanged.

The customers’ choice of transport mode is mainly based on cost, transport time and reliability, while environmental aspects receive very little attention.

The current situation as outlined above is likely to lead to the following development:

- Increase in Greenhouse Gas (GHG) emissions contrary to government plans for a large reduction.
- Increase in road congestion and risk of long queues at port gates.
- Increase in the number of serious road traffic accidents.
- Negative impact on the development of the Nigerian economy.

Both international experience and the results of the customer surveys. The following measures will need to be considered in order to achieve this solution:

- A new government transport policy, including substantial subsidies and incentives to promote intermodal transport through reduction of costs to customers and service providers.
- Regulatory changes permitting private intermodal operators to create seamless fast and reliable door-to-door rail and road transport solutions.
- Investments in intermodal infrastructure including railway lines and inland terminals to enable high-capacity intermodal services to be established in suitable corridors.
- The Lagos Port Corridor could be the main corridor for the government to enforce radical changes in the institutional aspects of intermodal movement.
These changes will speed up and enhance the development of intermodal in Nigeria.
Intermodal movement in Nigeria requires new innovation for the system to move forward and become one of the competitive alternatives in Nigeria. Such innovations may be 1) product innovations or 2) process innovations, which refer to a change in the way the product is delivered (Wiegmans et al, 2008). In the Nigerian scenario, intermodal logistics need to be structured and new ways to promote intermodal development need to be in place. For intermodal movement to be more attractive, the effective institutional framework should be in place with accommodative policies in order to improve the quality of service and the efficiency of the service providers. From the findings, the authority that governs the transport industry needs to use their platform to promote a positive attitude towards intermodal movement in Nigeria. The authority’s role would be the stepping-stone for the operators to be innovative in developing intermodal movement in Nigeria.

CONCLUSION
Intermodal movement in Nigeria shows great potential for its development. It is critical for Nigeria to make changes in the institutional aspects in order to ensure that intermodal services remain sustainable and competitive. However, the logistics of intermodal movement need to be clear so that continuous intermodal services can be developed. Reforming the institutional aspects would ensure that intermodal logistics could be in place and help promote intermodal especially in the selected corridor.
The main intermodal logistics issues that would create awareness of the importance of intermodal services are:
a) Establishing the Intermodal Transport Department
b) Introducing specific intermodal services
c) Setting up the green corridor concept
d) Developing a reward system for actors in intermodal movement
e) Collaboration and coordination issues
f) Quality of service monitoring.
Setting up an intermodal transport authority might be premature at this stage, but there is a need to set up a department under the freight division to focus on
intermodal planning and monitor it, whereby the authority would gain a more in-depth understanding of how to plan for intermodal movement and policy implementation in this green corridor.

Critical mass is not a problem in this corridor; however, the right strategy implementation might be essential for the future of intermodal.

It has always been the focus of the government to use transport to reduce GHG emissions and also reduce other environment issues such as congestion and accidents. However, the government seems to have failed to execute the methods and the strategy to promote intermodal in Nigeria.

The green corridor concept and the reward system should stimulate the interest of the actors in the intermodal system. It will demonstrate the best method to handle intermodal movement in Nigeria with further collaboration and enhancement of the actors’ quality systems and thereby increase the intermodal share in the respective corridors.

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