



High Performance Marine Vehicles in the Seaward Extension of City Highways

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ARTICLE INFO

Article history:

Received 07 November 2011;
in revised form 05 December 2011;
accepted 01 March 2012

Keywords:

Short sea shipping, marine
technology Nigeria

ABSTRACT

The work assesses new ways of developing the overall transport system in a sustainable way using methods that extends the road transport system to newly developed marine highways. A model that argues that present transport system is extensible where technology constraints are broken is portrayed. Government policy initiatives that support the sea transport alternative must however be in place to encourage this new developing sustainable transport option. A study was carried out to ascertain ways through which developing countries can benefit from this sustainable transport alternative which reduces road congestion, increases intermodal effectiveness, with comparable cost savings compared to air transport. High performance marine vehicles is viewed in this work as the missing link which developing third world nations must embrace to solve the ever increasing problem of road congestion arising from low transport infrastructure. Methods for assessing modal shares were applied in the work to determine ways for government assessment of modal overload in the distribution of passenger and freight traffic. In this respect, high performance marine vehicles are viewed as just part of the solutions to the existing problem. An analysis of traffic distribution in Nigeria was made to reflect the imbalance in the modal distribution of the entire sector leaning towards the road sector using available freight data.

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1. Introduction

Modern day road transport development has created new problems in terms of road congestion, air pollution, high freight charges and finally excessive cost of goods in the hand of the final consumer.

The above problem is present in both the developed and the developing nations and alternatives to road transport system is always being sought. However, as a result of the capital intensive nature of the above problem, developed nations more easily find solutions to the problem than developing nations.

Apparent alternatives to the road transport system are evidently the air, the rail and the short sea transport modes. However, in terms of cost, the air and the rail alternatives are far higher than the short sea shipping alternative. The short sea shipping sector thus makes itself the optimum choice for transport switching from the road sector. Marine vehicles available in the short sea shipping sector include short sea roro passenger ships, pure passenger marine vehicles and high performance passenger crafts moving over an air cushion. One other

factor in support of the seaward extension of city highways is the fact that it offers a sustainable solution to the problem of road congestion and excessive utilization. Sustainable transport development has been defined to include a transport system that is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy. Macbeth (2004).

1.1. Objectives

The objectives of this work includes inter alia:

1. To determine ways of switching transport from road to the short sea shipping sector in such a manner as to maintain a sustainable development of the entire transport system.
2. To ascertain the role of high performance marine vehicles in reducing road congestion in cities adjacent to a nations internal and territorial waters.
3. To determine the best option for developing third world nations

2. Literature review

The European Union by adoption of its motorways of the sea concept has stated beyond reasonable doubt its belief in the

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use of rivers and short sea transport as a transport switching alternative to the problem of road congestion. The European white paper transport policy for 2010 under the section “developing motorways of the sea”, declared that short sea transport is a real competitive alternative to land transport.

The document sees short sea transport in the same vein with motorways and rail ways. It is viewed as a policy that supports sustainable economic growth, social development and protection of the environment.

Baindur (2008) carried out a study whose problem hedged on methods for reducing the growing dominance of road transport for freight carriage over other modes of transport. Problems resulting from this overload of this sector he opined include congestion, bottlenecks and damage to human health and the environment. According to him, increased use of short sea shipping routes and inland waterways can provide part of the answer to road congestion and inadequate (or inefficient) rail infrastructure.

This means that short sea shipping is in competition with the rail sector in servicing hinterland freight flow sector of the overall transport system.

Loon (2009) opined that short sea shipping should be regarded as an integral component of comprehensive intermodal approaches that attract higher cargo volumes, enhance networks and provide genuine door to door services.

The European Transport document sees short sea shipping as a suitable transport option. Out of 25% of CO₂ emissions from the transport sector, marine transport contributes 7%, air 12% and road vehicles 75%. Other modes contribute 6%.

3. Research methodology

The work applied the use of regression analysis to assess the contributions of the three different modes of rail, road and short sea shipping (represented by water) to Nigeria's transportation system.

The quantity demanded (total freight available in the sector) was regressed against the independent variables of road freight, rail freight, gross domestic product GDP and short sea shipping freight. The model is extended to emphasize the new role that high performance marine vehicles has to play to ensure the sustainable development of the entire transport system.

4. Data presentation & analysis

Table 4.1: Nigeria's outward intermodal data compared to GDP 1989-2002.

YEAR	QDT	GDP	RAIL	ROAD	WATER
1989	881.845	224,796.7	22.634	499.416	139.128
1990	969.861	260,636.7	—	597.319	85.685
1991	3,240.990	324,010.0	5.400	833.640	103.652
1992	1,176.873	549,808.8	10.176	295.411	38.915
1993	2,398.888	697,090.0	—	524.469	99.690
1994	1,579.337	914,940.0	19.099	582.032	99.552
1995	1,674.856	1,977.740	504	541.032	98.400
1996	1,921,261	2,823,900	16	826,121	160,623

1997	2,498.000	2,939.650	0	656.000	218.000
1998	2,802.000	2,881.310	7000	593.000	218.000
1999	8,204.000	3,352.650	0	3,753.000	101.000
2000	8,763.000	4,980.943	7000	958.000	19.000
2001	10,586.000	5,639.865	0	844.000	45.000
2002	9,654.000	5,901.970	—	993.000	24.000

Source: CBN Annual Statistical Bulletin 2003.

4.1. Report of findings

Using the beta coefficients, the trend of dependence of the quantity demanded on the predictor variable can be represented with the equation.

$$QDT = 1621670 + 1.2191GDP + 17.908 \text{ Rak} + 1.110 \text{ ROAD} - 17.037 \text{ WATER} \dots\dots\dots (4.1)$$

Subjected to a t test, the finding from the analysis shows that at 5% level of significance, the predictor variables that still make significant contributions to the shipping demand output are GDP, ROAD and WATER. The rail sector's contribution to shipping output is not significant, according to our result. Again an inverse relationship ie negative sign was observed in the water mode. Explained by our a priori theoretical expectation, it means that the water mode plays a complementary role to the road mode in servicing Nigeria's shipping demand market.

The findings from our research actually reflect the realities of the economy as well as the transport modes to the shipping market. The shipping output demand increases as the gross domestic product GDP increases. The transportation of both import and export goods is dominated by just one mode of transport, the road mode. The inverse relationship with the water mode shows this. This further shows that the water mode must be improved to the extent that it begins to make a positive contribution to Nigeria's shipping market distribution. This offers an evaluation parameter for the assessment of the impact of newly introduced government regulations like the cabotage, introduced to improve water transportation. The view of this work is that to date, the impact of coastal shipping to the overall transport distribution of shipped goods in Nigeria is still negative. The government agent, Nigerian Maritime Administration and Safety Agency (NIMASA) should thus evolve newer ways of boosting activities in coastal water transportation in Nigeria. This offers a sustainable development option for the overall transport sector development. Furthermore, to sustain the road mode efforts should be made to ensure the rail system becomes operational for servicing the maritime sector. To date our research shows a total absence of operational impact on shipping activities in Nigeria.

The sector should be made to work and to impact on shipping output demand. The sector makes no significant contribution to the quantity of goods demanded for both import and export goods. The Nigerian Railway Corporation (NRC) is thus called upon to revise their carrying formula to create services for the maritime mode.

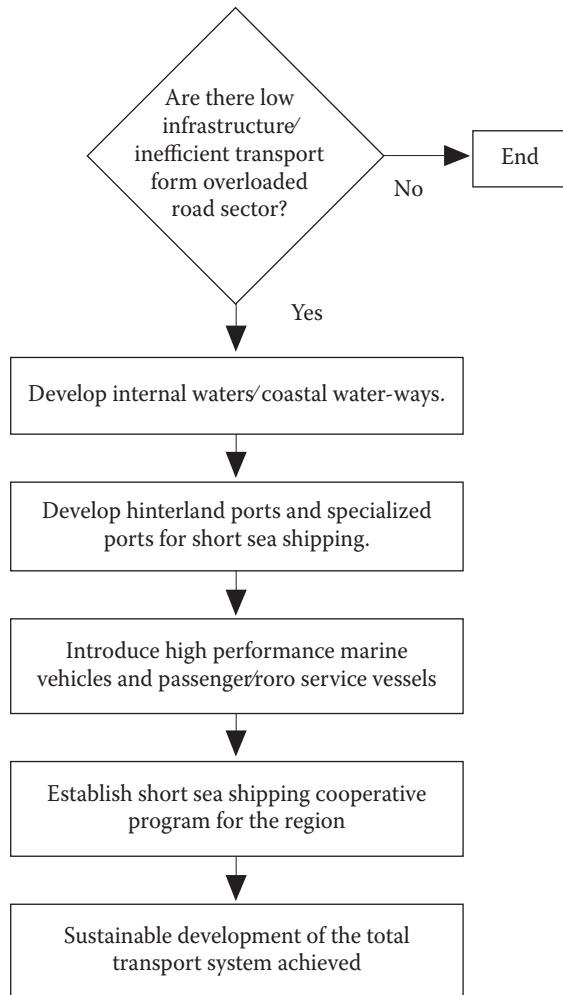


Figure 1: The sea motorway sustainable transport model.

5. The sea motorway sustainable transport option

The sea motorway sustainable model arises from the existence of poor and inefficient transport system resulting in road congestion, excessive atmospheric emissions, unhealthy environment and other unsustainable conditions. The sea motorway

sustainable transport option thus serves in decongesting the overloaded road sector of the total transport system.

For the sea motorway transport option to be active, the river systems and the territorial and coastal transport network of the particular nation must be put in a navigable condition. They should be properly dredged to serve marine vehicles for both passengers and roto freight services. River ports and sea-ports should also be put in place at appropriate locations to serve the short sea chipping sector. High performance marine vehicles, road and passenger vehicles of all forms should then be introduced into the sector to compete with the road and rail service sectors.

Finally, for the sustainable development of the entire transport system, an agency that will encourage the society to patronize the short sea shipping sector is required. This usually will come through the establishment of the short sea shipping cooperative program. This group will have to advertise the short sea shipping sector to attract both government and commercial society patronage.

6. Conclusion

High performance marine vehicles usually operate under the sphere of short sea shipping where they act in competition to both rail and road services.

The sea motorway sustainable transport model proposed in this work reveals the place of high performance marine vehicles in servicing the short sea shipping sector in particular and the total transport system generally. The work emphasized the sustainable role that the short sea shipping sector plays in the overall transport system.

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