

Freight Traffic at Nigerian Seaports: Problems and Prospects

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Abstract: The sea is the medium through which goods originating from and destined for different parts of the world are transported. Seaports in relation to trade are major gateways to the economy of Nigeria hence, play an important role in the development of the country. This study examines maritime freight traffic in Nigeria focusing on the types of freight, port competition for traffic and problems associated with freight traffic at the ports. Freight types are mainly containerised cargoes, general cargoes, roll-on-roll-off cargoes and petroleum products. General cargo was handled mostly by Tin Can island port, dry cargo by Apapa port and liquid cargo by Okrika port. Apapa port accounts for >30% of cargo throughput in the Nigerian seaports. This form of port specialisation has implications for the provision of facilities at the ports. Between 1990 and 2005, there was an increase in the cargo throughput, container traffic, net registered and gross registered tonnage of vessels at the ports and crude oil terminals. Major problems affecting freight traffic include inadequate cargo handling plants and equipment, long turn around time, cargo pilferage and excessive charges. The recent port reforms are expected to increase private sector participation and operational efficiency at the ports.

Key words: Freight traffic, port competition, port development, excessive changes, inadequate, Nigeria

INTRODUCTION

Transportation is a precondition for spatial interaction and a central dimension of the national and global production systems that are reshaping the world. Transport industries through nodal development provide for the movement of people and goods and provision of services. Global economic integration relies upon efficient maritime transport due to its unparalleled physical capacity and ability to carry freight over long distances and at low costs. Overtime, the maritime industry has substantially changed from an industry that was always international in its character to a truly global entity with routes that spans across hemispheres, transporting raw materials, parts and finished goods. Maritime transportation plays a major role in the national and international trade and economic growth. The seaborne trade represents >90% of the international trade in the world. A seaport is defined as a terminal and an area within which ships are loaded and/or unloaded with cargo and includes the usual places where ships wait for their turn or are ordered or obliged to wait for their turn no matter the distance from that area. Seaports in relation to trade are major gateways to the economy of a country. They represent a complex structure in a country's transportation system providing ship harbour interface services such as pilotage, dredging, provision of berths, maintenance of navigational channels, etc., ship-port interface in terms of loading and unloading cargoes and port-land interface in delivering cargo to and from the hinterland. In general seaports have five principal roles (Branch, 1986):

- Cargoes and passengers handling
- Providing services for ships such as bunkering and repair
- Shelter for ships in case of heavy sea and storm conditions
- Bases for industrial development
- Terminals forming part of a transport chain

Seaports are complex dynamic systems consisting of numerous interacting elements, influenced by random factors. Hence, full utilization of the available resources and efficient management of operations has two major goals. Under these two goals, many objectives will be achieved such as increasing the port throughput and utilization of resources (berths, cranes, quay, yards, etc.), reducing handling time, minimizing port congestion, minimizing disruptions, demurrage and operating costs (Tu-Chang, 1992).

Today in any context and in any country, it is essential that ports provide efficient, adequate and competitive services. If they fail, ship-owners who find them too costly or too slow will go elsewhere. Hence if ports do not provide cost-effective services, imports will cost more for consumers and exports will not be competitive on world markets, national revenue will decline as well the standard of living of all people. Nigeria has a total of eleven ports and eight oil terminals organised in three zones of Western, Central and Eastern zones (Table 1). The central zone with its headquarters in Warri and the Eastern zone with its headquarters in Port Harcourt are predominantly oil terminals, although Warri,

Table 1: Distribution of Nigeria ports by zones

Zones	Ports	Headquarters
Western	Apapa port complex; Tin Can island; RoRo port; Inland container depot Ijora	Apapa
Central	Warri port; Sapele port; Koko port; Burutu port; Aladja steel jetty; Escravos; Forcados and Pennington oil terminal	Warri
Eastern	Port Harcourt; Federal ocean terminal; Federal lighter terminal; Okrika refined petroleum oil jetty; Crude petroleum oil terminals of Bonny, Brass, Qua-Iboe and Antam; Calabar port	Port Harcourt

Sapele, Koko, Port Harcourt, Calabar and the Federal ocean terminal are important general cargoes. Several studies (Ogundana, 1970; Ogunsanya, 1986) revealed that the ports were developed in response to increased port traffic, political factors and international development in the maritime industry.

The seaports are very important to the Nigeria's trade as practically all imports and exports move through the ports. The importance of the seaports is attested to by the fact that approximately, 99% by volume of Nigeria total imports and exports are sea-borne. Nigerian ports control 60% of imports in West and Central Africa. The seaports provide an overwhelming economic advantage over all other modes of transport considering the huge tonnage of goods, it can carry over long distances. The ports have contributed to regional economic integration in the West African sub-region and have served as the major determinant of how economic activities are distributed. The maritime industry is a major long term determinant of national growth.

Furthermore, the seaports have encouraged the development of other modes of transport. For example, the railway lines were constructed to link the ports with areas of resource exploitation and densely populated settlements. Development of the maritime industry have made possible the growth of a large scale complementary transport infrastructure which has fostered the emergence of a matrix of coordinated transport system for intra-city movement apart from the prospect of international. Nigerian ports provide employment opportunities directly and indirectly. Several people are engaged in various port activities such as clearing and forwarding, dock work, haulage, stevedoring operations, warehousing and maritime insurance.

The seaports due to their strategic location foster industrial growth. Industries are located close to seaports in order to reduce the cost of transportation. Over 70% of Nigerian industries are located close to the seaports. The Lagos region alone accounts for 40% of the industries in Nigeria.

In light of the growing importance of the seaports to the economy of Nigeria, this study examines freight traffic trends in Nigerian seaports, highlighting some operational characteristics, port competition and factors affecting the performance of the ports.

FREIGHT TRAFFIC TYPES AND TRENDS

Bird (1971) classified cargo handled in maritime transport into two main types: bulk and break bulk. Bulk freight represents the traditional segment of maritime freight distribution with a wide variety of physical characteristics of the cargoes. Each has specific requirements with respect to stowage in the ship, methods of transshipment and inland transport. Bulk cargoes refer to both dry and liquid freight that is not packaged minerals. It comprises of homogenous materials without packaging such as ores, coal, grain, raw sugar, cement and crude oil products, etc., usually for a single consignee and destination. This cargo tends to have numerous origins. The break-bulk often referred to as general cargo consists of an almost infinite variety of freight in small consignment for numerous consignees and packaged in a variety of bags, bales, boxes, crates and drums of varying shape and sizes.

The term bulk cargo is used for commodities that may be carried in ship loads (such as banana, refrigerated meat and cars) while the term neo-bulk is used for cargoes such as forest products when carried in large quantities in a standardised form. Similarly, there are dry and wet cargoes. Dry bulk cargo is shipped in large quantities and can be easily stowed in a single hold with little risk of cargo damage. Dry cargoes are those that are on solid stage. It is generally categorized as either major bulk or minor bulk. Major bulk cargo constitutes the vast majority of dry bulk cargo by weight and includes among other things, iron ore, coal and grain. Minor bulk cargo includes products such as agricultural products, mineral cargoes (including metal concentrates), cement, forest products and steel products and represents the balance of the dry bulk industry.

Dry cargo ports provide facilities such as warehouses, transit sheds, stacking areas and so on in order to cater for various forms of such cargoes. Wet cargoes are petroleum products, wet cement (in powdered form) which require specialised vessels to handle them.

In terms of seaborne trade volumes (and the shipping ton-miles generated), the dominant influence is that of the major bulk trades. The cargo type is reflected in the associated port activity. For the higher unit value containerized break-bulk cargo, a port is usually the

gateway through which the cargo passes to the hinterland while for the bulk cargo, it acts as a terminal-the cargo is stored and often processed before onward movement. In the case of much bulk cargo, the port site is often an industrial site linked with the transformation and processing of those commodities. While for a break-bulk, flows can be bi-directional (inward and outward), bulk flows are dominantly directional (inward or outward). Bulk cargo is thus, imported and processed with the output commonly belonging to a different transport chain that cannot be serviced by the original maritime equipment. Even if the unit and possibly the total value of bulk cargoes may not compare with those of general cargo, the sheer volumes involved give them a special significance in transport systems.

On the basis of the method of packaging, maritime freight traffic can be categorised into general cargoes, containerized cargoes, Roll-on-Roll-off (RoRo) cargoes and petroleum products. General cargo involves break-bulk cargoes which consist of various goods usually in a variety of bags, bales, boxes, crates and drums of diverse shapes and sizes. Some examples of the items include flour, rice, fertilizer, coal, fish, sugar, hides and skin and cement. Each of these commodities has specific characteristics such as fragility, sweating and tainting. The Apapa port handles mainly general cargo and accounts for a large percentage of cargo throughput in the Nigerian seaports. The high demand for raw materials by industrial establishments around the ports accounts for the dominance of general cargo in Apapa port. The general cargo operation at Apapa port involves break-bulk cargoes while Tin Can island and Port Harcourt ports operate mainly break in cargoes.

Containerization is a method of packaging of cargoes in a unitized form in a way that the cargo moved is amenable to a multimodal movement without break-bulk. Container is used for the bulk rather than bagged movement of commodities such as coffee and cocoa beans. Tank containers are used for various liquid cargoes such as beer, wine and chemicals. Containers can be distinguished by their usages and sizes. The commonly used containers as identified by their sizes are 20, 30 and 40 feet long. The height and width are commonly 8 feet. These types of containers are mainly used for carrying break-bulk or general cargoes such as spare-parts, textiles and drinks, etc. In terms of usage, containers can be classified into flat racks containers, half-height containers, bulk containers and special built containers. Flat racks containers are used for carrying cargo that does not conform to the normal dry cargo container. The cargo may be too large for example, boilers, generators, agricultural and construction machinery and

transport vehicles such as buses, boats, tanks and trucks. Perishable goods like fruits and vegetables that require ventilation while on transit are shipped using ventilated containers. Insulated containers are used in carrying goods like powder or granulated commodities. Refrigerated containers are carried in reefers or specially, built vessels with temperature controlling device in carrying perishable goods like tomatoes, fruits and dairy products such as milk and meat. Half-height containers are normally four feet containers designed to carry cargoes of high density. These are goods that are heavy but occupy little space.

Petroleum products (crude petroleum and refined petroleum) are usually shipped using tanker vessels. Tankers are specialised ships designed for bulk liquid cargoes. The tanker vessels are quick in loading and discharging of petroleum products. Crude oil is transported from the oil fields to refineries and from the refineries to distribution centres and fuelling ports. Thus a large proportion of the tonnage is owned by oil companies.

CARGO THROUGHPUT IN NIGERIAN SEAPORTS

The volume of cargo throughput at the ports is an important measure of the level of economic development of a country. Cargo throughput in Nigerian seaports can be classified on the basis of cargo type into general, dry and liquid cargoes cargo. General cargo includes containerized, uncreated vehicle (RoRo vehicles), fish and other commodities such as flour, sugar, hides and skin. Table 2 shows general cargo traffic at the ports between 1990 and 2005. A total of 98,097,869 inward cargo was shipped into the ports out of which containerized cargo had the highest volume with 38,359,846 ton (39.1%) followed by fish with 8,886,389 ton (9.05%), uncreated vehicle with 2,153,755 ton (2.2%) and other commodities with 48,697,879 (49.6%).

The large volume of containerized cargoes is due to the high demand for industrial machines and raw material by industries in the country. These cargoes are easily packaged in containers to make them amenable to multimodal movement without break-bulk. Outward cargoes comprised of mainly containerised cargo with 7,935,710 ton (57.2%), uncreated vehicle with 19,029 ton (0.1%) and fish with 3584 ton (0.02%).

The trend indicate that inward traffic increased from 3,728,750 in 1990-5 696,466 (an increase of 52.8%) after which it declined steadily to a minimum of 3 438,707 (a decrease of 39.6%) in 1995. The decline was due to the reduction in the country's revenue from oil as e result of the fall in export volume. Also, illegal charges at the ports

Table 2: General cargo traffic in Nigerian ports

Years	Container		Vehicle uncrated		Fish		Others		Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
1990	1287677	346594	-	-	257666	-	2183407	264783	3728750	611377
1991	1476961	287054	-	-	352686	-	2492338	315497	4321985	602551
1992	1794219	310287	-	-	499643	972	3402604	413077	5696466	724336
1993	1521131	326815	-	-	455597	40	2541539	365392	4518267	692247
1994	1139491	408624	145740	1177	277242	-	288944	282384	1851417	692185
1995	1355828	371222	93120	3845	258634	-	1731125	384498	3438707	759565
1996	1367409	533587	38138	597	411285	224	1875422	525707	3692254	1060115
1997	1542785	630902	35913	2340	434104	1500	2777033	525540	4789835	1160282
1998	1847386	627608	67694	1118	557981	196	3050416	462785	5523477	1091707
1999	2142932	665333	129043	869	605649	-	3361323	572894	6238947	1239096
2000	2355540	633437	213742	368	666695	161	3644356	566247	6880333	1200213
2001	3238007	578237	510721	160	800828	-	5010976	306047	9560532	884444
2002	3860339	528429	306402	906	804979	339	5054847	259862	10026567	789536
2003	4737740	563698	207761	1569	811251	-	4307419	203231	10064171	768498
2004	4007486	494036	194376	4373	859677	47	3348071	174678	8409610	673134
2005	4684915	629847	211105	1707	832472	105	3628059	285372	9356551	917031
Total	38359846	7935710	2153755	19029	8886389	3584	48697879	5907994	98097869	13866317

substantially increased the cost of importing and consequently a large share of Nigeria's external trade was conducted informally through ports in neighbouring countries such as Ghana. The volume of inward traffic gradually rose from 3,438,707 in 1995 to a peak of 10,064,171 in 2003 (an increase of 192.7%). Since then, the volume of traffic has declined.

The trend of outward cargo traffic shows a similar pattern of rises and falls. The volume of outward cargo increased from 611,377 in 1990 to 724,336 (an increase of 18.4%) then fluctuated reaching a maximum of 1 239,096 ton in 1999. This is followed by a steady decline to 673,134 ton in 2004. However, there was a marginal increase of 36.2% to 917,031 in 2005. The decline in outward cargo traffic can be attributed to the shift to oil exports in the country while non-oil exports were de-emphasized. Generally, between 1990 and 2005, inward cargo increased by 150% while outward cargo increased by just 50%. This indicates that the country is import dependent. Measures to improve non-oil export are therefore necessary.

Dry cargo traffic comprises of mainly wheat grain/offal, construction cement, etc. Data on dry cargo traffic in Table 3 shows an undulating trend similar to that of the general cargo. A total of 85,649,989 ton of dry cargo was moved into the ports between 1990 and 2005. There was an increase of 151.6% in inward cargo between 1990 and 1993. This was followed by 44.7% decline in 1994 and an increase of 440.12% in 2003. Interestingly, the volume of inward cargo increased from 1 381,009 ton in 1990 to 12 335,850 ton in 2005 (an increase of 793%). This astronomical rise in dry inward cargo is as a result of the increased demand for cement consequent upon increase in construction activities in the country. The volume of construction cement shipped into the ports rose from 782

996 in 1990-6 241,745 in 2005 (an increase of 697%). Outward cargo decreased from 368,445 in 1990 to a minimum of 122,574 ton in 2000 (a decrease of 66.7%). However, there was a steady rise in the volume of outward dry cargo between 2001 and 2005 as a result of the rise in wheat/offal export. Thus, the volume of outward dry cargo declined from 368445 in 1990 to 200,386 in 2005 (45.6% decrease). This further confirms, the dependence of the nation on external markets while the volume of the country's exports has increased minimally.

The liquid cargo subgroup consists of refined petroleum, liquefied natural gas and vegetable oil, etc. Table 4 shows the liquid cargo traffic at the ports. Whereas a total of 84,001,260 ton of liquid cargo was moved into the country between 1990 and 2005, 111,189,004 ton was exported. The volume of outward cargo is higher than inward cargo because Liquefied Natural Gas (LNG) which is the next major export product besides crude oil accounts for 46% of the outward cargo. This is followed by refined petroleum with 15.2%. The trend of inward cargo is characterised by alternating rise and fall. Generally, inward cargo traffic declined from 4,229,042 in 1990 to a minimum of 3,420,943 in 1997 (a decrease of 19.1%). This is followed by similar fluctuations to a maximum volume of 8 128,978 in 2004. On the other hand, outward cargo traffic decreased from 5,850,534 in 1990 to a minimum of 2,964,994 ton in 1995 (a decrease of 49.3%).

This was due to the oil workers strike and Niger Delta crisis which resulted in reduced output from the oil companies. The increase in the volume of refined petroleum exported and the introduction of liquefied natural gas culminated in the significant increase of outward cargo to 14,579,897 in 2005. The number of vessels, net and gross tonnage of vessels that called at

Table 3: Dry cargo traffic at Nigerian ports

Years	Wheat/ffal		Cement		Others		Total	
	Inward	Outward	Inward	Outward	Inward	Outward	Inward	Outward
1990	-	-	782996	-	598013	368445	1381009	368445
1991	-	-	1380416	-	770788	407833	2151204	407833
1992	155896	-	1806057	-	738048	263850	2700001	263850
1993	1027197	29900	1695903	80	751750	300154	3474850	330134
1994	587172	22600	856395	-	477729	236205	1921296	258805
1995	660245	20951	849301	-	524012	237572	2033558	258523
1996	799520	32794	1044686	-	666114	267245	2510320	300039
1997	1068573	44000	1182677	597	751596	468671	3002846	513268
1998	1424009	46757	1784571	-	731602	443668	3940182	490425
1999	1473907	27047	2250221	-	755465	267315	4479593	294362
2000	1533673	7854	3451319	-	1037259	114720	6022251	122574
2001	2237423	7484	5784945	-	1530901	143771	9553269	151255
2002	2563541	21932	5378654	-	1455793	151335	9397988	173267
2003	2428569	107178	6433523	-	1515193	79089	10377285	186267
2004	2609531	89115	5838388	-	1920568	107285	10368487	196400
2005	3633168	52905	6241745	-	2460937	147481	12335850	200386
Total	22202424	510517	46761797	677	16685768	4004639	85649989	4515833

Table 4: Liquid cargo traffic at Nigerian ports

Years	Refined petroleum		LNG		Vegetable oil		Others		Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
1990	4074131	5810500	-	-	-	-	154911	40034	4229042	5850534
1991	4360446	5770048	-	-	11803	-	176083	38948	4548332	5808996
1992	4723512	4433692	-	-	35154	-	259368	66047	5018034	4499739
1993	4721986	4679904	-	-	56762	-	126090	36762	4904838	4716666
1994	3838334	3274443	-	-	11803	5119	57119	51327	3907256	3330889
1995	3726440	2951158	-	-	5038	5700	86228	8136	3817706	2964994
1996	3954473	3788664	-	-	7417	26859	59842	75324	4021732	3890847
1997	3279500	3597907	-	-	3793	17120	137650	80604	3420943	3695631
1998	4098513	3140452	-	-	3297	3000	245169	313270	4346979	3456722
1999	4797825	3310911	-	-	-	-	234966	1637236	5032791	4948147
2000	6107164	2232497	-	5953567	79748	6050	141000	187303	6327912	8379417
2001	5155610	2822202	-	5549251	65872	-	333208	1864789	5554690	10236242
2002	5473875	2414936	-	8084749	105916	-	202034	318373	5781825	10818058
2003	7141208	1565070	-	9292832	96829	2000	159800	111985	7397837	10971887
2004	7909550	1398486	-	11529827	92035	-	127393	112025	8128978	13040338
2005	7159944	3181701	-	11264515	163200	-	239221	133681	7562365	14579897
Total	80522511	54372571	-	51674741	738667	65848	2740082	5075844	84001260	111189004

Table 5: Number and Gross registered tonnage of vessels that entered all Nigerian ports and crude oil terminals, 1990-2005

Years	No. of vessels	Annual percentage change in No. of vessels	NRT (ton)	Annual percentage change in NRT	GRT (ton)	Annual percentage change in GRT
1990	774	-	39492391	-	74982803	-
1991	3913	405.55	52849251	33.82	79350441	5.82
1992	3995	2.09	53194356	0.65	83933086	5.77
1993	3943	-1.30	54902487	3.21	87082533	3.75
1994	3073	-22.06	51221804	-6.70	79347649	-8.88
1995	2023	-34.16	47690441	-6.89	78838624	-0.64
1996	3202	58.27	53773485	12.75	83939447	6.46
1997	3585	11.96	58236541	8.29	92843341	10.60
1998	3972	10.79	60056043	3.12	97892193	5.43
1999	3762	-5.28	57193097	-4.77	94742691	-3.21
2000	4087	8.63	71658861	25.29	123037909	29.86
2001	4473	9.44	72725956	1.48	130013586	5.66
2002	4143	-7.37	65162035	-10.40	118211042	-9.07
2003	4315	4.15	72050769	10.57	132388233	11.99
2004	4553	5.51	94460522	31.10	160905554	21.54
2005	4586	0.72	78669001	-16.71	145495860	-9.57
Total	58399	-	983337040	-	1663004992	-

Abstract of port statistics, Nigerian ports authority

the ports is shown in Table 5. Between 1990 and 1992, there was 416% increase in the number of vessels that

called at the ports. This is followed by a decrease between 1993 and 1995. For instance, there was 34.16% decrease in

the number of vessels between 1994 and 1995. This was during the period of political uncertainty in the country which affected trade between Nigeria and her trade partners. There was a sharp increase in 1996 (58.27%) followed by an undulating trend to a peak of 4586 vessels in 2005. Regardless of the undulation, the trend is on the increase. This upward trend in the number of vessels can be attributed to the stability in the port and the economic reforms embarked upon by the government.

The net and gross tonnage of vessels corresponds to the trend identified above for the same reasons. There was an increase in net and gross tonnage of vessels at the ports between 1990 and 1993. This was when there was improvement in the economy after the world economic recession of the 1980's. The trend is followed by a decline between 1994 and 1995 and an undulating pattern between 1996 and 2005. Generally, the net and gross tonnage of vessels increased by 99 and 94%, respectively between 1990 and 2005. This is indicative of a virile port traffic and port development.

Overall, there was an increase in general cargo (container traffic, uncrated vehicle, fish and other commodities), dry cargo (wheat/offal, construction cement, etc.) and liquid cargo (refined petroleum, LNG, vegetable oil, etc.) during the period under review. This is indicative of port development in the country since, traffic trend is an important determinant of port development (Ogunsanya, 1986). General cargo accounts

for the highest volume of inward cargo particularly container cargo (38,359,846 ton) while liquid cargo accounts for the highest volume of outward cargo comprising mainly LNG with a total of 51,674,741 ton. The implication is that Nigeria's imports comprise mainly manufactured goods whereas, crude oil and LNG are the major export products. This renders export performance susceptible to the vagaries of the international oil market. Although, the government has provided incentives to boost and diversify exports such as grants, credit facilities, duty draw-backs, manufacture-in-bond, creation of export processing zones, the impact on non-oil export remain severely constrained by high transaction cost resulting from inter alia infrastructural deficiencies, lack of finance, macroeconomic fragility and uncompetitive official exchange rates, export levies and cumbersome export procedures.

PORT COMPETITION

Port competition refers to the importance of each port in the aggregate port system. It helps to understand the volume of traffic handled by each port. The discussion on the volume of each cargo shipped at the various ports is restricted to 1994-2005 due to unavailability of data. Figure 1 shows the trend of traffic handled by the Nigerian ports between 1994 and 2005. A total of 309,869,746 ton of cargo was handled at the ports during

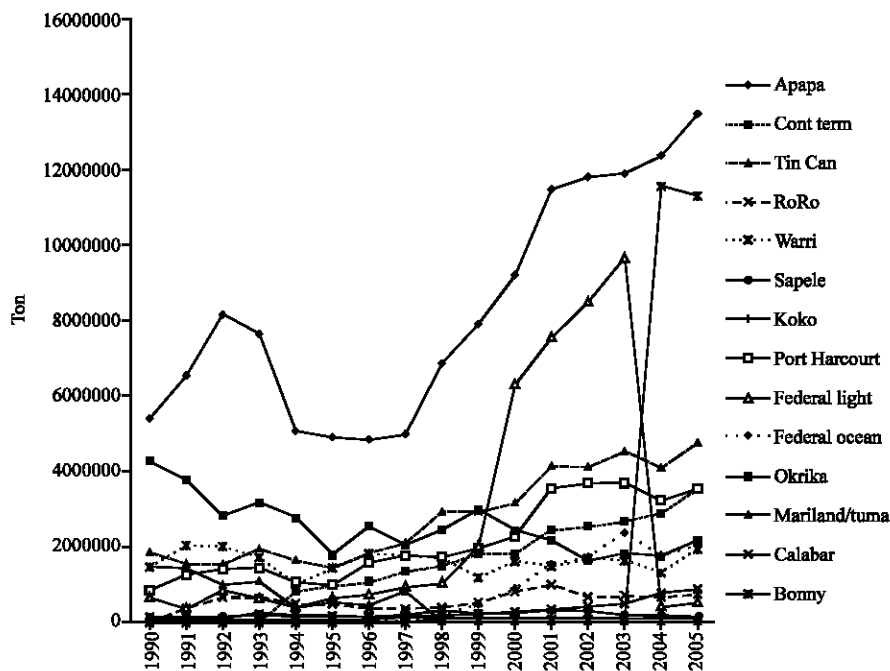


Fig. 1: Cargo throughout at Nigerian ports (ton)

the period. Liquid cargo had the highest volume with 157,064,488 ton (50.7%) followed by dry cargo with 7,8519,340 (25.3%) and general cargo with 74,285,918 ton (24%). Apapa port was responsible for 33.7% of the traffic followed by federal light terminal with 12.4% and Tin Can Island with 12.1%. While Koko port had the least with 0.3%. On the basis of type of cargo, Tin Can island port dominated general cargo traffic with 30.5% followed by Container terminal with 30.2% and Apapa with 23.8%. The concentration of general cargo at these ports is not surprising as the South Western zone of the country is home to 35% of the nation's industries and population. Apapa port handled 50.8% of the dry cargo followed by Port Harcourt with 21% and Tin Can island port with 12.9%. Liquid cargo was handled mainly by Okrika port with 67% followed by Apapa with 11.8% and Federal light with 8.2%. Hence, cargo traffic is concentrated in Apapa, Tin Can, Federal light terminal, Port Harcourt and Okrika ports. General cargo is handled mainly by Tin Can island port, dry cargo by Apapa port and Liquid cargo by Okrika port.

PROBLEMS OF MARITIME FREIGHT TRAFFIC

The increase in the level of activities in the ports as reflected in the number of vessels calling at the ports and the volume of cargoes handled calls for the assessment of the capacity of the ports to handle present and future cargo throughput. According to Takel, the availability of storage space influence the efficiency and productivity of any port since, there is an almost inevitable mismatch between the rate of cargo transshipment and the rate at which it enters and leaves the port on the landward side. The discussion in the previous sections point to the fact that the seaport is vital to Nigeria's export trade and to her productivity. There is no doubt that Nigeria's capacity to earn foreign exchange and her ability to import essential commodities would collapse without the port system. However, despite the huge investment in port development there remain serious inadequacies in

Nigeria's maritime freight transport. These inadequacies manifest in various forms such as absence of intermodal connectivity, inadequate cargo handling plant and equipment, delay of ship turn around time, insecurity of imported goods, low skilled manpower and excessive charges. All these factors affect, the movement of freight which in turn clog the will of economic development in the country. The lack of an East-West rail link connecting the western port of Lagos and the South-Eastern area of the country constitutes a structural inadequacy. First, important food-producing areas are not linked by rail to Lagos markets. Also, the absence of such a link diminishes the complementary impact of the railway network on the rest of the national transport system thus reducing the potential output of the ports. Further more, the demise of the railway led to total dependence on road transportation. This results in delay of caused by piece-meal loading, slow movement and en-route breakdowns. A further inadequacy concerns the issue of cargo handling plant and equipment. Although, the volume of cargoes handled at the ports has increased tremendously overtime there is no concomitant increase in the number of cargo handling plant and equipment at the ports. For example, the number of cargo handling plants decreased from 586 in 1990 to 557 in 2005 (Table 6). The poor state of the equipment makes the situation worse. Out of the 557 equipment available at the ports in 2005, only 232 are serviceable.

Thus, 232 are used to handle tonnes of cargo. There is a concentration of the cargo equipment in the western and eastern zone ports. Western zone ports have a total of 171 port equipment while Eastern and Central zone have a total of 43 and 18, respectively. RoRo port has the highest number with a total of 82 followed by container terminal with 48 and Apapa port with 33. Inadequate equipment at the port makes unloading and clearance of cargoes difficult and time consuming.

There is no serviceable cargo handling plant and equipment in Koko and Sapele ports. Another problem that affects cargo traffic at the ports is the long turn around time of ships. Turn around time is the period between the arrival time and departure time of a vessel in a port. Table 7 shows the average turn around time of

Table 6: Serviceable cargo handling plant and equipment at Nigerian ports as at December, 2005

Factors	Apapa	Cont. terminal	Tin Can	RoRo	Warri	Koko	Sapele	Port Harcourt	Onne	Calabar	Total
Forklift	19	9	3	28	4	0	0	10	2	12	87
Mobile crane	2	0	2	1	1	0	0	0	0	4	10
Trailers	0	0	8	1	0	0	0	1	0	0	10
Freight lifter	2	2	3	7	13	0	0	0	0	2	29
Container handler	3	13	0	11	0	0	0	5	0	5	37
Portal crane	2	0	0	0	0	0	0	0	0	0	2
Tractor	3	13	1	33	0	0	0	1	0	0	51
Locomotive	2	0	0	0	0	0	0	1	0	0	3
Tower crane	0	3	0	1	0	0	0	0	0	0	4
Total	33	40	17	82	18	0	0	18	2	23	233

Table 7: Average turn-around time of ships completed at Nigerian ports (days per ship)

Years	Apapa	Container	Tin Can	RoRo	Warri	Koko	Sapele	Port Harcourt	Federal light	Federal ocean	Calabar
1992	9.85	-	8.88	2.18	7.01	5.65	7.21	17.22	5.33	-	-
1993	6.95	-	12.23	2.58	6.00	6.67	5.00	12.11	3.43	-	-
1994	5.21	1.87	9.55	2.49	3.44	5.72	4.55	8.22	3.77	-	-
1995	11.40	1.78	8.46	2.92	3.76	3.93	4.33	7.70	4.77	-	-
1996	9.29	1.98	10.41	1.80	5.16	8.00	5.35	9.33	2.00	7.50	-
1997	9.14	1.81	12.40	1.65	5.17	7.80	6.82	8.67	4.10	3.11	-
1998	9.18	2.49	16.00	1.68	6.25	8.38	3.69	9.38	2.34	2.67	-
1999	11.10	1.98	9.73	1.64	6.14	6.50	5.83	9.39	2.16	5.16	-
2000	12.97	1.95	11.48	1.62	4.97	5.64	5.02	11.00	3.90	3.89	-
2001	15.02	4.56	9.61	2.82	4.91	6.05	4.44	11.97	2.71	3.27	-
2002	22.54	6.29	10.42	2.41	4.95	5.57	4.26	13.71	2.30	7.31	-
2003	20.71	3.26	8.18	1.38	7.35	7.46	8.10	16.88	1.98	2.62	-
2004	13.69	4.51	6.58	1.48	6.05	6.07	5.04	13.16	2.25	2.45	1.86
2005	9.64	10.50	6.00	1.71	6.01	4.52	5.44	12.24	2.86	3.43	2.93
Average	11.90	3.58	9.99	2.02	5.51	6.28	5.36	11.49	3.13	4.14	11.90

Table 8: Temporal analysis of cargo pilfered/cargo discharged at Nigeria's seaports (in metric ton)

Years	Vol. of cargoes discharged (metric ton)	Vol. pilfered (metric ton)	Vol. of cargoes/per case of pilfering
1993	6176929	114.90	53785.3
1994	7297467	88.51	82447.9
1995	8170387	86.79	94139.7
1996	9189772	84.00	109402.0
1997	12497915	109.10	114554.7
1998	13136194	113.60	115635.5
1999	16131570	115.50	136667.3
2000	222285904	159.20	139986.8
2001	22345179	132.00	169281.7
2002	8704554	44.60	195169.4
2003	21524654	86.30	249416.6
Total	147460522	1131.50	-
Average	1340502	103.14	129973.8

ships completed at the Nigerian ports between 1992 and 2005. Table 8 indicate that there was no significant positive improvement in turn around time of ships overtime. The average turn around time for ships at Apapa port in 1992 was 9.85 days, this reduced to 9.64 days in 2005 while at the container terminal, the turn around time for ships increased from 1.87 days in 1999 to 10.50 days in 2005. In 2005, Port Harcourt port had the longest turn around time with 12.24 days followed by Container terminal with 10.50 days while RoRo port had the least with 1.71 days. The low turnaround time of ships at the RoRo port can be attributed to the high number of cargo equipment at the port and the easy method of loading and discharge of cargoes which characterise its operations. Cargo pilfering is a common crime in seaports but it is very pronounced in developing countries where most of the operations are labour intensive. Cargo pilfering is the act of stealing cargo in small quantities. It involves the broaching of container and vandalizing property in the port. Cargo pilferers (also known as wharf rats) steal vehicle parts, food items such as bags of rice, cartons of sugar, cartons of fish, electronics and clothing. They also remove cargo in whole without going through normal procedure.

The cargo pilferers gain access into the ports through the lagoon/approach route by hiding inside vehicles

entering the seaports, by going through the space created by breaking the perimeter walls of the seaport and by beating the security at the port gate. Table 8 shows the trend in cargo pilfering in Nigerian ports between 1993 and 2003. The volume of cargo pilfered at the ports decreased steadily from 114.9 ton in 1993 to 84 ton in 1996. This is followed by a steady increase to 159.2 in 2000 and subsequent decline to 86.3 ton in 2003. The spatial pattern of cargo pilfered in Table 9 shows that the volume of cargo pilfered was highest at the Apapa port with an average of 50.2 metric ton of cargo pilfered annually. The seaports with the least incidence of pilfering are Onne and Calabar ports with an annual average of 0.5 metric ton each. But when compared with the volume of cargo pilfered, Onne port was the most secured port in Nigeria with 1 metric ton of cargo pilfered compared to 740,702 metric ton of cargo discharged. This was followed by Calabar and Tin Can island ports. The least secured port was Warri port where 1 metric ton of goods was pilfered in every 43,382.9 metric ton of cargo discharged. This is followed by RoRo and Port Harcourt ports. The variation in the level of cargo pilfering at the ports may be attributed to the ownership structure of the ports which in turn influence port activities. Whereas Onne port is a landlord port, the Port Harcourt port is an operating port. The operating port system is where the port authority provides the superstructure and carries out the functions of pilotage, stevedoring activities, warehousing and cargo delivery. On the other hand in the landlord port, the port authority provides the port facilities while the private operators provide the plants and equipment and carry out the functions of cargo delivery and discharge. A mixed port is a combination of both port systems. This suggest that privatisation of the ports which involves a change of the ownership structure from operating to landlord port system could significantly reduce cargo crimes and other security problems in the ports. The maritime industry has become a technical sector of Nigeria's economy as such requires highly

Table 9: Spatial analysis of cargo pilfered at Nigerian ports

Seaport	Vol. of cargo discharged (11 years average)	Vol. of cargo pilfered (11 years average)	Ratio (Qty Pilfering case)	Ranking (most secured port)
Apapa	7,253817.6 (55.11%)	50.2 (48.67%)	144,498.4 (113%)	4
Tin Can	2,689,381.9 (20.06%)	14.9 (14.45%)	180,495.4 (138.8%)	5
RoRo	510,044.6 (3.8%)	9.6 (9.31%)	53,129.6 (40.81%)	2
Warri	581,331.3 (4.34%)	13.4 (13%)	43,382.6 (33.38%)	1
pH	1,769,107.3 (13.20%)	14 (13.57%)	126,364.9 (97.27%)	3
Onne	370,351 (2.76%)	0.5 (0.48%)	704,702 (575%)	7
Calabar	223,247 (1.74%)	0.5 (0.48%)	446,494 (362.5%)	6
Total	13,405,502 (100)	103.1 (100%)	-	-

Table 10: Manpower requirements by staff function (ports and harbours)

Staff	Required	Available	Shortfall	Shortfall (%)
Port manager	9	8	-1	11
Traffic manager	1	1	0	0
Harbour manager	25	9	16	64
Marine surveyor	2	0	2	100
Ship marine engineer	1	1	0	0
Ship pilot	6	2	-4	67
Berthing master	79	55	-24	30
Pilot boat operator	-	-	-	-
Tug operator	-	-	-	-
Marine craft operator	840	620	-220	26
Dredger operator	5	5	0	0
Dredger engineer	5	5	0	0
Marine craft engineer	4	3	-1	25
Maintenance engineer	0	0	0	0
Technical/mechanic	142	112	-30	21
Marine rating	60	10	-50	83
Port safety surveyor	2	0	-2	100
Hydrographic surveyor	16	8	-8	50
NAV-aids technicians	21	14	-7	33
V.T.S.staff	3	0	-3	100
Radar operator	2	0	-2	100
Marcom radio operator	85	65	-20	24
Pollution control staff	72	42	-30	42
Diver	10	1	-9	90
HRD/training manager	1	0	-1	100
Total	1391	961	-430	31

skilled personnel and professionals. A study on the Training needs and assessment in the Nigeria's maritime sector was conducted by the Maritime academy in 1997 to assess and quantify the human capacity requirements in the industry. Findings of the study indicate that the stock of skilled manpower in the maritime industry when compared with the requirement is low.

With a total personnel requirement of 6931 and a total employed of 4646, there is on the aggregate a shortfall of about 33% of skilled manpower required in the industry. A breakdown indicates that for ports and harbour, the 31% shortfall recorded centres mainly on the area of Harbours master (64% shortfall), Marine surveyor (100%), Ship pilot (67%), Port safety surveyor (83%), Hydrographic surveyor (50%), VTS staff (100%), Radar operator (100%), Driver (90%) and HRD/training manager (100%). These areas constitute urgent areas of manpower training and development for port and harbour personnel. In addition, the study made projections in manpower

requirements in the maritime sector for years 2000, 2005 and 2010 for low, medium and high cadres of job functions. The projection indicates further significant shortfalls. For example, of the ten maritime establishments considered, the Nigerian Ports Authority (NPA, 2005) and the Federal Ministry of Transport are expected to face serious manpower shortages.

The shortfalls range from 183 and 205 in year, 2000; 186 and 275 in 2005 to 189 and 370 in 2010. For ports and harbours, the shortfall for 2010 is 659. Similar shortfalls are recorded for fishing establishments, merchant fleet companies, maritime pollution control search and rescue staff and general maritime administration (Table 10).

CONCLUSION

This study has examined the spatio-temporal pattern of freight traffic at Nigerian ports and the factors affecting the effective performance of the functions of the ports. Although, cargo throughput container traffic and net registered tonnage of vessels at the ports have increased overtime, port activities are hindered by inadequate cargo handling plants and equipment, long turnaround time, cargo pilfering and excessive charges. These problems no doubt have resulted in the decline of national revenue and the competitiveness of the ports in the global port system. The ineffectiveness of port operations and subsequent diversion of Nigerian imports which are then smuggled into Nigeria by road led to the privatisation of the ports. The recent concessioning of the operations of some of the ports is expected to promote competition and increase port operational capacity.

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