

Africa Transport Technical Note

Trade and Transport



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*Containerized Maritime Trade
between West-Africa and Europe*

Hub and Spoke vs. Multiple Ports of Call

This note is based on SSATP Working Paper No. 31 titled "Multiple Ports of Call vs. Hub and Spoke: Containerized Maritime Trade between West Africa and Europe" by Gylfi Palsson.

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For information on these notes, contact Leita Jones in the Africa Region of the World Bank, Washington, DC. Internet address: ljones2@worldbank.org.

In a hub and spoke system of containerized seaborne trade, cargo to a region is delivered first to a primary hub port and then transported to its final destination, whether by sea, rail, road or inland waterways. Similarly, exports from the region are collected in the primary hub, then transported to final destination. While these primary ports are often equipped to allow for a quick turnaround time of vessels, there are usually two primary characteristics that set them apart from other ports: the primary hubs (a) tend to be geographically central to the region (sometimes with a substantial hinterland — that is, it attracts a considerable amount of cargo that would in any case flow through that port); and (b) can accommodate larger vessels than other ports in the region.

The West and Central African coast from Mauritania to Angola is one of the few regions of the world without a dominant hub distribution port. Since the evolution of the hub and spoke concept has been driven by competitive forces to lower container unit costs, the natural question to ask is: What features in the containerized traffic between the region and Europe, the predominating trade flow, have prevented hub development?

Container Traffic

Based on data collected, it is estimated that 1.3 million twenty-foot equivalent units (TEUS), both full and empty, are moved in and out of the region annually. These movements are served by thirty-three ports, which vary extensively in quantity handled and operational capacity and efficiency.

Approximately 500,000 TEUS are loaded import units, close to 70 percent of which come from Europe. On the export side, 320,000 loaded TEUS are moved. Directional imbalance in the containerized trade is therefore significant. For the region, the ratio between import and export is close to 61:39. Consequently, the number of non-revenue empty containers exported from the region results in hefty container repositioning costs to operators.

The table on page 2 shows *total regional quantity* (countries in the region between Mauritania and Angola, including island states and landlocked countries) and *sub-regional breakdown* (countries in the range indicated) of movements of containers.



In '000 of TEUS	IMP			Export		
	Loaded	Empty	Total	Loaded	Empty	Total
West Africa:						
Mauritania – Angola	494	152	646	318	328	646
Sub-regions:						
Senegal – Cameroon	380	123	503	269	234	503
Côte d'Ivoire – Cameroon	319	97	416	220	196	416
Equatorial Guinea – Angola	105	30	135	51	84	135
Mauritania – Liberia	70	25	95	47	48	95

Various sources and author's estimates. Information on some ports is dated or non-existent and a fairly high level of uncertainty is involved, particularly for the southern part of the region.

The table shows that distribution of container cargo flow is unequal within the region. This can be explained by the variation in population density, but also by the concentration of regional trade in the Gulf of Guinea.

Intra-regional trade is negligible. Although data on containerized cargo moving within the region is not readily available, a best estimate is that 20,000 TEUS are moved (import and export) between countries in the region.

Containerization of general cargo in the region is less than 40 percent. Growth in container traffic tends to be erratic, even declining at times. This, of course, only reflects the volatile economic fortunes of the area.

Maritime Operators

Given all the effort invested during several decades in maintaining an elaborate system for the protection of national lines in West Africa, it is interesting to see that the market share of the national lines is very slim in the containerized trade between the region and Europe. According to best estimates, the five national lines that offer some containerized transportation only muster up about 6–7 percent of total capacity offered.

As in any industry protected for a long time from external competition, the sheltering does not nurture a strong domestic company, but instead inflicts and weakens.

The national lines that offer containerized transportation service run a fleet of small and generally old vessels. One reason for this is their practice of nearly always offering only service between their home countries and Europe, thereby limiting them to a small cargo base. Hence, the limited direct competition among the national lines never led to the synergy and natural growth seeking strategies that might have allowed some of these lines to become regional powers and facilitate their survival in the more intense competition of the mostly European lines. Even today, only two of the five national lines

offer their services to West African countries other than their home base.

The containerized maritime trade between West Africa and Europe is primarily serviced by about fifteen carriers, of which the two largest ones in the market are estimated to offer just under 50 percent of the capacity available. The capacity offered by the four largest operators is a little over 70 percent.

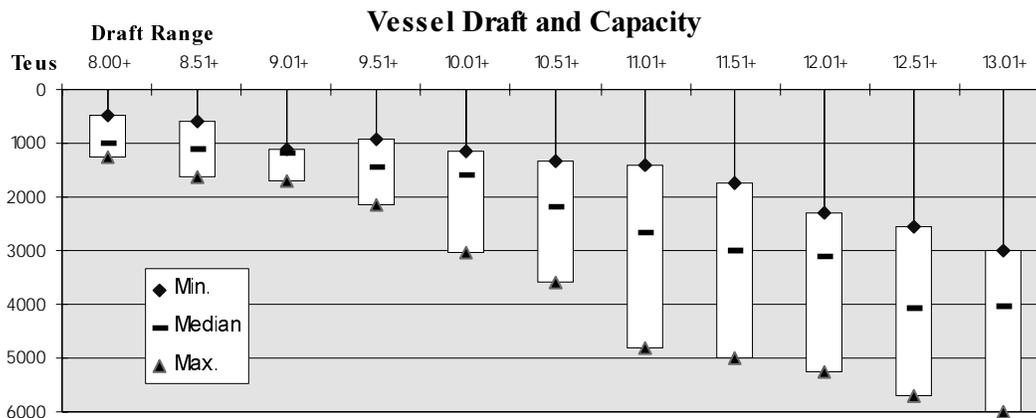
Generally, the service consists of visits to several European ports, from where the vessels straddle the coast of West Africa, calling numerous ports along the way. Often, the ships call in as much as 10 to 20 ports. The closest to an exception to this would be Maersk's route, which uses Algeciras in Spain as the single port that serves West African countries.

Only the largest operators employ fully cellular vessels in the approximate range of 1,100–1,700 TEUS, while other operators generally use far smaller vessels. This results in a merchant fleet being employed on average less than 800 TEU.

There are three underlying reasons why the fleet serving the region has not evolved as fast as it has globally towards more efficient container vessels.

First, the cargo traffic, particularly northbound, is a mixture of unitized and non-unitized cargo, requiring more adaptability of vessels. The greater mix of vessel types and wide use of multi-purpose vessels is needed because exports from the region are primarily agricultural products, wood and minerals, which in unprocessed form rarely lend themselves to containerization.

Second, draft limitations in ports in the region generally do not permit the access of large vessels. The ports vary widely in their ability to accept and service container vessels; but nearly all are limited to vessels with draft of under 10 meters, thus making the 1,500-1,700 TEU vessels sometimes used in the routes about the largest that can be used. The graph shows the approximate relation between draft and capacity.



The graph indicates container vessel capacity in TEUs, given certain draft ranges. Results are based on an examination of 950 vessels. The closer the median point is to either draft range, the greater concentration there is of vessels that fall between the median and that end of the range.

Third, one of the major advantages of containerization of cargo is the ease with which it changes modes (for example from vessel to truck to rail). In West Africa, however, this intermodalism is underdeveloped, and a very small percentage of imported containerized cargo leaves a port area intact. Instead, the container is stripped in port and loaded on truck for delivery; therefore, many of the export goods come to port non-containerized. Stuffing at that point has already taken away a large incentive for containerization. Because of this, West Africa has not seen the same rate of containerization of traditionally bulk cargo as many other regions, and approximately 80 percent of containers are stripped or stuffed in port.

Cost Comparison

For the purpose of examining unit cost difference between a best example of a current multiple port call system and a hypothetical optimal hub and spoke system, the region from Senegal to Cameroon was chosen. This was done to reflect a route system common to many shipping companies operating in the West Africa–Europe trade — a sub-region where containerization of cargo is more prevalent — and because this area is more reliable than the rest of the region.

A stripped unit cost approach was used — i.e., only cost elements directly relevant to the outcome were included. Therefore, the stripped unit costs presented here are exclusive of several elements that contribute to the total cost for an operator.

The multipoint system examined in the analyses consists of calls at five European ports and nine African ports, while the hypothetical hub and spoke system features two European ports and Abidjan, from where a three route feeder system would operate. A summary of the cost comparison can be seen in the table on page 4.

The comparison indicates that the region would be marginally better off under a hub and spoke system than the current direct route system. There are, however, several caveats to consider:

The stripped unit cost difference is not pronounced and offers a low-level of comfort. This is understandable, since the main-line vessels that could be used in a hub and spoke system in West Africa would, because of draft limits, only be incrementally larger than those now used by larger operators for multiple ports of call.

If all cargo were diverted to a hub and spoke system and all the unit cost savings were used for customers' benefit — both of which are unlikely assumption — it could be interpreted that the US\$ 12 difference in unit costs between direct route and hub and spoke represented the maximum potential rate reduction per TEU.

The only clear “winner” would be the hub — Abidjan. Alternatively, under a hub and spoke system all West African ports would be “losers,” except for Abidjan. As such, that port would reap all the benefits, while in terms of cost and, to a great extent, service level, all other ports in the region would be worse off.

Minor changes in the flow of goods to and from the region — e.g., lesser proportional importance of Abidjan — would rapidly change these results. This re-emphasizes the point that the difference in unit costs is very small.

No port in West Africa meets the test for a primary distribution point. None of the ports in the region is geographically central enough, given the current major trade flows, and nearly all have draft problems that prevent a substantial increase in the size of main vessels.

In sum, the findings do not indicate a clear-cut case for or against a hub and spoke system in the West African–European trade. The estimated benefits are not conclusive enough to pre-

Cost in US\$ pr. TEU	Direct-Route ⁽¹⁾	Hub and Spoke⁽²⁾	Change % ⁽³⁾
Abidjan <i>Feeder Route East A.</i>	418	229	-45.20
Douala, Lagos, Cotonou <i>Feeder Route East B.</i>	418	466	+ 11.50
Tema, Lome, Lagos <i>Feeder Route North.</i>	418	458	+ 9.57
Freetown, Conakry, Dakar	418	466	+ 11.48
Weighted Average⁽⁴⁾	418	406	-3.25

⁽¹⁾ Direct Route. Unit costs are average costs per TEU for all ports of call shown in that schedule.

⁽²⁾ Hub and Spoke. Unit cost for individual ports. Includes US\$ 140 transshipment cost for the feeder ports (all ports except Abidjan).

⁽³⁾ Change %. Change in percentage between the two systems — direct route cost as base. Results in this column are based on dollars and fractions in columns ⁽¹⁾ and ⁽²⁾ (whole dollars only shown here).

⁽⁴⁾ Weighted Average. Weighted average in column ⁽²⁾ and ⁽³⁾ takes into account the proportional import and export of TEUs for each port.

dict an inevitable change to a hub and spoke system, and the changes in service levels, especially for the northern cities, are unbalanced in favor of the hub without substantial lowering of overall costs.

Conclusion

Hub and spoke systems in containerized maritime transport often result in significant cost advantages, benefiting the various parties to the trade. Yet, the merit of a hub and spoke system in the region does not meet expectations.

It can be argued that containerized maritime transportation to and from West Africa is now as reasonably developed as can be expected given the region's commodity mix, cargo volume, port infrastructure, inland transport, and administrative procedures. It can also be said that any lowering of transport costs will likely come from further liberalization of transportation policies rather than from restructuring routings. Cases from South America and South Asia, areas where liberalization has recently been carried out, show substantial lowering of cost to shippers. There are indications that the same trend is starting to repeat itself in those West African countries where markets have just recently been opened to competition.

In recent years the maritime sector has become very fluid and increasingly has assumed an international character. It is not a national core industry in itself, but rather a conduit to successful cross-border trade. West Africa's attempts to regulate maritime policies and operations to their own benefit are at best futile and more likely a high priced inhibitor to international trade and economic development.

The best way to cut the total logistics cost for West Africa is to improve current practices to achieve a seamless transportation chain: rationalize customs operations, weed out corruption, increase port efficiency, and cut through the red-tape — in short, create a commercially user-friendly environment.