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Why Cargo Dwell Time Matters in Trade

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The international community has been increasing investment in projects that promote trade facilitation and improve logistics in the developing world, including in ports. In Africa, a key motivation for such projects has been a presumption that poor infrastructure and inefficient border control agencies are the major causes of extended delays in sub-Saharan Africa (SSA) ports. Based on new data and analysis, this note argues that collusion between controlling agencies, port authorities, private terminal operators, logistics operators, and large shippers is an important part of the problem. Decreasing dwell times in ports requires governments to combat collusive practices between the private sector and public authorities and recognize that large-scale investments in infrastructure are not sufficient to reduce logistics delays.

Infrastructure gaps and high transport costs are critical factors hindering growth and poverty reduction in SSA. Efficient, low-cost transport systems are prerequisites for African countries to become competitive in the global market. Hummels (2001) demonstrates empirically that increased transport time dramatically reduces trade. Without rapid import processes, trade based on assembly operations for export is impossible: delays and unpredictability increase inventories and prevent integration into global supply networks. The automotive industry in South Africa listed barriers to reducing inventories as the most important of 12 major impediments to business.

Reducing port dwell time is critical. Arvis et al. 2010 demonstrate that over 50 percent of total land transport time from port to hinterland cities in landlocked countries in SSA is spent in ports.¹ It has been unclear, however, which port operation components contribute most to this dwell time. Over the last decade, international donors have assumed that controlling agencies such as customs are primarily responsible for long port delays, with infrastructure issues as the secondary cause. Data collected in a new study (Raballand et al. 2012) suggest that

this assumption is incorrect in most ports in SSA. The study comes at a time when several investments in container terminals are planned in SSA. Disentangling the reasons behind cargo delays in ports is crucial to understanding (i) if projects by the World Bank and other donors have addressed the most salient problems and (ii) if institutional port reform and infrastructure investment, sometimes complemented by customs reform, are the most appropriate answers to the problem.

A New Survey of Dwell Times in SSA

Port dwell time refers to the time cargo (containers²) spends within the port or its extension. To separate the components of cargo delays, the study undertakes a comprehensive analysis of several unique data sets:

- i. Data collection in six ports in SSA (Raballand et al. 2012): Tema (Ghana), Lomé (Togo), Douala (Cameroon), Mombasa (Kenya), Dar es Salaam (Tanzania), and Durban (South Africa).³
- ii. Firm surveys (manufacturers and retailers) in Kenya, Nigeria,⁴ South Africa, Uganda, and Zambia to assess logistics

constraints on importers/exporters, large- and small-scale companies, and traders and their demands for port efficiency.

- iii. Discussion of results with stakeholders in the selected countries.

Raballand et al. (2012) used a mix of databases, individual questionnaires, and aggregated statistics from customs agencies and terminal operating companies in eight countries. Except for Durban and Mombasa, all of the studied ports are run by private container terminal operators.

Breaking Down Dwell Time

Dwell time figures have become a major commercial instrument to attract cargo and generate revenues. Port authorities and container terminal operators have increasingly strong incentives to lower the real figure. The average or mean dwell time has usually been the main target indicator in SSA ports. This statistic is easy to compute and easy to understand. However, because high dwell times are often driven by a minority of problematic shipments, it is difficult to decrease the average/mean dwell time in the short and medium term. In Douala, for example, planners set an objective of 7 days at the end of the 1990s, but the dwell time remains over 18 days, despite real improvements for some shippers.

Cargo dwell times⁵ in SSA ports are unusually long—more than two weeks on average, compared to under a week in large ports in Asia, Europe, and Latin America. Excluding Durban and Mombasa, average cargo dwell time in most ports in SSA is close to 20 days (table 1). Very long dwell times in SSA ports hurt the efficiency of port operations and the economy in general. A common assumption holds that the private sector (terminal operator, customs broker, owner of container depots, shipper) has an interest in reducing dwell time. But this is not always true, and is pointedly not the case in most SSA ports, where collusion of interests between controlling agencies, port authorities, private terminal operators, logistics operators (freight forwarders), and large shippers drives up prices for consumers.

Poor handling and operational dwell time generally account for no more than 2 days out of at least 15 days of dwell time on average. Most delays are due to transaction and storage time, resulting from controlling agencies' performance and,

more importantly, the strategies of importers and customs brokers. In SSA, importers often have strong incentives to use ports as storage areas. At the Douala port, for example, storage in the port is the cheapest option for an importer for up to 22 days (11 days beyond the container terminal's free time). Firm surveys demonstrate that low logistics skills and cash constraints explain why most importers have no reason to reduce cargo dwell time; in most cases, it would increase their input costs. In addition, collusion of interests may reinforce rent-seeking behaviors among shippers, intermediaries, and controlling agencies. Some terminal operators earn large revenues from storage. Customs brokers do not fight to reduce dwell time because the inefficiency is charged to the importer and eventually to the consumer.

Prevailing market structure also helps explain the durability of certain patterns in cargo dwell time. Firm surveys show that companies may use long dwell times as a strategic tool to prevent competition, similar to a predatory pricing mechanism. Incumbent traders and importers, as well as customs agencies, terminal operators, and owners of warehouses benefit from long cargo dwell times (two to three weeks), which act as a strong barrier to entry for international traders and manufacturers. Delays at port also may be considered a means to sustain comfortable rent generation. Cargo dwell times in SSA show an abnormal dispersion, with evidence of discretionary behaviors that increase system inefficiencies and total logistics costs.

In Durban, two factors have helped improve dwell time: a strong, domestic private sector with interests in global trade, and a public sector willing to support it. A "penalty storage" fee has discouraged long-term storage at the port and has helped Durban maintain a dwell time of three to four days, comparable with ports in Europe and the lowest in SSA. Using Durban's example and simulations of container movements in a port terminal, simulations suggest that a reduction of dwell time from one week to four days would more than double the capacity of the container terminal without any investment in physical extensions (Raballand et al. 2012).

Storage Dynamics and Strategies of Importers and Customs Brokers

Case studies and shipment-level analysis show that long dwell times are mostly related to factors that depend on shippers. More specifically, the demand by importers for excessive port dwell time seems to be related to the private sector's inventory management and "business model" (including informal practices).

Analysis demonstrates that cost-minimization and profit-maximization strategies may explain why behaviors that seem irrational, such as leaving cargo in the port, are in fact the best option for an importer. Shippers importing containerized cargo have to choose a logistics path-

Table 1. Average Dwell Time in SSA Ports (Days)

Durban	Douala	Lomé	Tema	Mombasa	Dar es Salaam	Average (Durban excluded)
4	19	18	20	11	14	16

Source: Kgare et al. (2011) and surveys.

way, starting with loading containers in the supplier's facilities and ending with unloading them in the customer's facilities. The decisions within the pathway are generally based on rational criteria such as cost, delivery time, frequency and risk, as well as some behavioral patterns (for example, repeated buyer behaviors).

The analysis shows that any market player seeking to minimize total logistics costs will try to reduce port dwell time. But two secondary conclusions are important. One is that long clearance times encourage shippers to split their annual orders into smaller, more frequent batches. Another is that companies seeking to minimize total logistics costs will, in some cases, purposely leave their cargo in the port. This happens when the financial cost of clearing cargo immediately from the port is higher than the potential storage-cost savings in private or third-party storage facilities outside the port. In other words, shippers may wait to sell the cargo—holding it in relatively inexpensive port storage facilities—before paying the required port clearance charges. Thus, port terminals become strategic storage units.

Market Structure and Profit Optimization

Other observed strategies, including the paradoxical situation where shippers seem to be indifferent to long dwell times, can be explained using the economic theory of monopoly. Despite being a cost setter, a rational monopolist should seek to reduce port dwell times to optimize profits because he or she cannot pass on all costs to clients without losing sales. But where demand is inelastic to price, the monopolist is not affected in the short term by higher logistic costs and will therefore make no effort to reduce dwell times. Such a scenario is likely to happen for cyclical demand patterns that are elastic to price only in the long term (food supplies, drugs, equipment, and so forth).

A third behavior observed among monopolistic companies is opportunistic pricing. In some cases, adverse logistics

conditions allow a company to justify higher markups or hold inventories to speculate on higher sale prices. Among oligopoly cases, in a cartel or leader–follower situation, businesses will follow monopolistic pricing strategies. In a price war, the market behaves as if in free competition, and companies try to minimize dwell time.

Market structure also helps to explain why high cargo dwell times are difficult to reduce. Monopolists and cartels have an incentive to reduce dwell time, but to retain their monopoly power, they must discourage worldwide competition. A long cargo dwell time (two to three weeks) is a strong barrier to entry by competitors. Thus, in most SSA ports, a vicious circle arises in which monopolists favor high dwell times, which discourages global competition and enforces their market power.

Terminal operators' incentives may also affect dwell time. Storage tariffs bring revenues, so the optimal policy for a port operator could be to increase dwell time. Port authorities might be interested in increasing dwell times because: (i) as total revenues increase, employees receive informal payments, and (ii) higher dwell times provide justification to increase port capacity, which means additional funding for infrastructure investments.

This cycle explains why cargo dwell time is so stubborn and why the industries that prosper in SSA are not time sensitive—such as exports of raw materials or minerals. Those that flounder are time-sensitive, value-added industries.

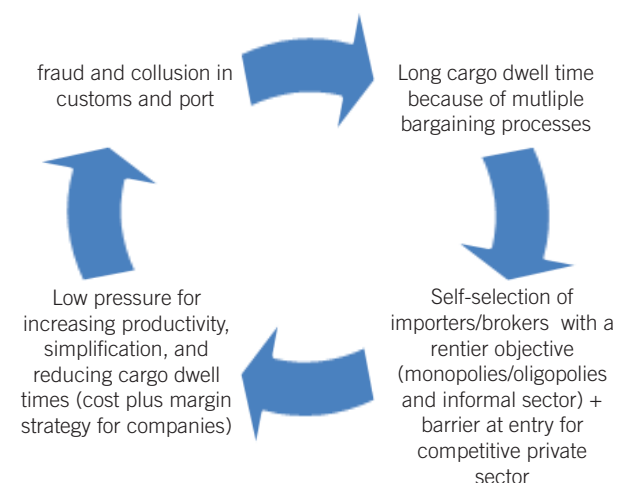
Implications for Donors in SSA

These findings may help explain why many trade facilitation measures have faced difficulties in SSA. Market incentives are too weak for supply-side measures to drive radical changes in trade logistics efficiency. Rather, actors in the trading, industrial, and logistics sectors exhibit risk-averse behaviors because they are operating in a context of oligopolistic competition where significant adjustments do not translate into obvious gains for them. An implication is that governments and donors need to re-think intervention strategies. Table 2 presents policy recommendations to reduce high dwell times in SSA. One of the worst options is to invest in additional storage and off-dock yards where congestion occurs. Structural issues that lead to long dwell times, including demand characteristics, need to be tackled before undertaking costly physical extensions. Effective solutions to high dwell times in SSA ports will revolve around the challenging task of breaking the private sector's short-term collusive strategies and providing incentives for public authorities, intermediaries and shippers to reduce delays.

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Figure 1. The Vicious Circle of Cargo Dwell Time



Source: Raballand et al. 2012.

Table 2. Policy Recommendations

Dos	Don'ts
When facing a port's capacity shortage, envisage o more optimal use of the existing capacity by targeting long-stay containers/cargo and encouraging fast clearance through price incentives.	When facing port's capacity shortage, immediately consider capacity extensions.
Conduct a careful assessment of the way the private sector operates before investing in port infrastructure: understand demand before changing supply.	Necessarily privatize/concession a container terminal to reduce dwell time.
Inform public decision makers at highest levels (prime minister, ministries of economy and finance) on the need to implement public governance–related actions to build a broad coalition to change the equilibrium. This should include thorough analysis of the economic cost of poor system performance to the national economy.	Support measures that create new rents and reduce system transparency, such as proliferation of off-dock container yards.
Sensitize the local population and trading communities on the importance of port clearance performance and the proper calculation of total logistics costs.	Consider as a given that everybody is aware that transport and port “costs” are high, and address the issue of port delays only from a monetary cost perspective (with no mention of the time and reliability costs).
Identify port performance indicators with a benchmark pegged to the most efficient shippers in the port.	Report averages only with no distinct evaluation of good, average, and poor performance.

Source: Authors' compilation.

Notes

1. Wilmsmeier, Hoffmann, and Sanchez (2006) found that the combined port efficiency of the importing and exporting countries' ports has a very strong impact on maritime charges. Increasing the indicator for port efficiency by 1 percent reduces freight charges by 0.38 percent. If the two countries of the sample with the lowest port efficiency improved their efficiency to the level of the two countries of the sample with the highest indexes, the freight charges on the route between them would be expected to decrease by 25.9 percent.
2. Even in SSA, more than half of total imports are containerized, and this traffic is growing. Data for containers are more systematic and reliable than bulk traffic data.
3. This study strived to select the largest or among the largest ports in the four subregions: Durban in southern Africa (which is also the largest in SSA), the two largest in East Africa (Mombasa and Dar es Salaam), Douala in Central Africa, and Lomé and Tema in West Africa.
4. Nigeria was selected because although it undertook a major port reform, it has continued to face long dwell time. Nigeria is also one of the most important African economies.

5. This note focuses on import containers because they are important for import-export models, and dwell time is usually low for outbound containers. Most boxes stay in port of one to two days to be marshaled before loading. Bulk or noncontainerized general cargo usually fit specific patterns of storage and loading/unloading strategies.

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