

Estimating the Cost of Import Container Dwell Time for the Indonesian Economy

1. How to Measure Trade Costs Associated with Time Delays and Uncertainty?

Trying to estimate the impact of trade facilitation measures, like reducing one day of import container dwell time, has not a straightforward answer. There are several observations on the costs that need to be taken into account:

- a) At the **Firm Level**, the supply chain (export, import or local distribution) is affected by what happened in terms of:
 - **Additional direct costs** i.e. actual payments or costs to support the supply chain (e.g. additional labor costs, warehouses, etc)
 - **Time** (average delays)
 - **Reliability**, i.e. how predictably the inputs will be delivered on schedule, which affects the response of outputs. Hedge for uncertainty in the delivery can take the form of extra inventory or expensive express shipments.

For example, in a shipment of raw material needed in a specific manufacturing industry e.g. auto parts to produce motorcycles, additional direct cost could involve extra storage fees and additional service fees from freight forwarders, among others. In terms of time, the delays in the production chain would increase average production costs (e.g. standby labor or unused capital) and the lack of reliability could account for a large inventory of auto parts.

- b) **The impact on firm production is industry specific.** Firm producing or selling time sensitive products are more concerned with uncertainty. This is an important concern for perishable or production (parts or finished products) integrated in global supply chains.
- c) **The increase of supply chain costs are passed through the national economy in a number of ways:**
 - i. Distributors (e.g. wholesalers, retailers) may pass *the extra logistics costs to the consumer* with a price markup or through stock out.
 - ii. *The share of logistics costs in production costs will influence the probability that firms enter and stay in a market*, whether domestic or export oriented.
 - iii. In the long run, logistics costs should *discourage a shift to the production of time sensitive (TS) goods from non time sensitive (NTS) goods*.

Unfortunately so far there is no single model that includes all these explanations providing a complete picture of the impact of changes in trade supply chain, such as changes in import dwell time at the port. There are essentially two distinct conceptual frameworks:

1. **Macroeconomic trade models**, which from international trade statistics estimate econometrically the value of time, i.e. taking average days of import for each country, these models estimates the average cost of an additional day spent on this process. These models are relevant for long run impact of facilitation (points c-ii and c-iii above) and provide global average, not country specific, value of time.

2. **Supply chain models**, which compute the impact on logistics costs of the importing or exporting firms of the parameters (time, cost, reliability) of the trade supply chain, including the port transit.

2. Estimation from Supply Chain Models

Given the detailed information available for Indonesia, the model that better reflects the impact of dwell time is the supply chain model. The macroeconomic trade model provides an overall estimate that includes the long term impact of the delays, but is not specific to Indonesia.

The supply chain method is a straightforward estimation of the costs supported by the shipper given the following supply chain characteristics:

- Price of transportation services paid to the operators
- Administrative costs and fees
- The costs of managing delays especially the uncertainty in the time of delivery of the goods

The later cost component is directly relevant to the estimation of the impact of dwell time. **Arvis et al (2007, 2010)**¹ proposed to estimate it as the cost of the inventory needed to hedge the uncertainty of time, with an acceptable small probability of stock out, dependent on the commodity or the industry. In the real world it does not mean that firms necessarily maintain those levels of inventory, as they may choose other solutions to deal with uncertainty such as more expensive shipping solutions, like express shipments.

With the supply chain model, the cost implication of the increase by one day is about **0.53% for TS products** and **0.30% for non TS products**.² Using these estimates, the impact of one additional day of dwell time in **Indonesia** in 2010 was **US \$51 million for TS goods** and **US\$ 300 million for non TS goods**, which brings up a total of **US \$351 million for each additional day in 2010**.

Using the 2010 data for **Tanjung Priok**, the impact of one additional day of dwell time was **US \$23 million for TS goods** and **US\$133 million for non TS goods**, which brings up a total of **US \$155 million for each additional day in 2010**. This means that if Tanjung Priok has a dwell time of 6 days and it's 3 days over the optimal average time, **the cost of those 3 additional days would add up to US \$468 million or 0.8% of the total value of imports**.

The impact of reducing 3 days of dwell time is very high if these value is compared with the value of the investment needed. Since most of the investment needed to reduce dwell time in Tanjung Priok includes regulatory reforms and change in processes and procedures, the cost-benefit analysis is very positive and encouraging.

On the other hand, **if no action is taken to reduce dwell time given the predictions on the growth of containers, the situation could worsen dramatically and the additional cost of a day would also increase.**

¹ Arvis, J. F., Raballand, G., & Marteau, J. F. (2007). The cost of being landlocked: logistics costs and supply chain reliability. World Bank Policy Research Working Paper, 1-81.

Arvis, J., Marteau, J., & Raballand, G. (2010). The cost of being landlocked. The Cost of Being Landlocked (Vol. 1, pp. 1–99). The World Bank.

² According to UNCOMTRADE database, in 2010 Indonesia had 7.1% of TS goods, 74% of non TS goods and 18,9% other type.

3. The Impact of a one day reduction of dwell time to terminal operator's capacity

On average the number of imported container through JICT about 2,500 containers/day (for year 2010). **A reduction of dwell time from an average of 6 days to 5 days would give JICT an estimate of extra 15,000 containers capacity for one month** (30 days/5 days x 2,500 containers). Given the lack of space in Tanjung Priok, this extra space gained from a reduced dwell time would impact the terminal efficiency and reduce the congestion.