



MIT SCALE RESEARCH REPORT

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Informing Creation of a Stockpile to Improve Supply to Post-Emergency Humanitarian Operations

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Informing Creation of a Stockpile to Improve Supply to Post-Emergency Humanitarian Operations

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EXECUTIVE SUMMARY

AidOrg¹ serves roughly 33 million refugees and internally displaced persons (IDPs) worldwide. Over 1 million of these people live in camps relying on AidOrg and other humanitarian organizations to provide them with basic necessities such as water, food, shelter, sanitation facilities and health care. These populations are highly vulnerable and supply chain failures at AidOrg lead directly to unnecessary suffering.

Like many other humanitarian organizations, AidOrg supports two supply chains: one for emergency response and another for mainstream (post-emergency) programs. While the emergency response supply chain is functioning well, the mainstream supply chain has performed poorly leading to chronic delays and product shortages. Recently, AidOrg has taken the initiative to improve the mainstream supply chain and is currently planning a major strategic shift: the creation of a pre-positioned inventory stockpile to support mainstream operations. Our research is embedded in this process and aims to inform decisions such as where to locate the stockpile along the supply chain and how to determine the appropriate stockpile level. Furthermore, this work seeks to demonstrate the value of using data to inform strategic decision making within the humanitarian sector.

Our research was limited by the quantity and quality of the data available. However, by analyzing 2008 procurement and shipment transaction data for 7 core non food items we were able to generate a picture of aggregate supply and demand that was not previously available to the organization. We hope that this dataset, along with our key findings and insights, will assist AidOrg in implementing a global stockpile. A few of the key findings are listed below:

- Lead times highly variable (co-efficient of variation approximately .55)
- Distribution logic, demand seasonality and demand variability unknown
- Few ports of entry and exit (5 ports of exit, 7 ports of entry make up 80% of total volume)

¹ The organization's name has been changed to preserve their privacy.

- 91% of supply originates in Asia
- 59% of total demand is realized in Africa, and 25% in the Middle East

With these and other findings from the data analysis, we were able to offer insights into alternative network designs and compare them based on lead times, transport costs, and an estimation of stock level and financial requirements. The two scenarios we developed are: a global stockpile co-located with the emergency response *stockpile in Dubai*, and a *stockpile at the primary supplier port of exit in Mumbai*.

Compared to the current network that operates without a global stockpile, these scenarios offer the benefit of shorter lead times by pre-positioning items closer to beneficiaries, reduced transport costs by creating mixed containers, and the creation of a more responsive supply chain overall. Through our analysis we were not able to select an ideal location, however we were able to determine that both scenarios would eliminate approximately 38% of total lead time as experienced by the country programs. On average, port to stockpile lead times would be shorter under the Mumbai scenario, since 60% of all supplies originate in Mumbai, however, port to final destination lead times remain roughly the same.

Based on differences in lead time and lead time variability, we generated estimates of stock pile level and financial requirements for both Dubai and Mumbai. Assuming a 99% service level, Mumbai was a slightly more favorable option. However, due to data limitations, specifically in the area of demand and demand variability, our analysis was inconclusive and we recommend that AidOrg conduct a full network design analysis

In summary, our thesis contributed in three areas. First, we created a dataset synthesizing information from multiple sources. Secondly, we used this dataset to create a picture of supply and demand. Lastly, on the basis of our findings we offered insights that we hope will inform the creation of a mainstream global stockpile. As other humanitarian organizations face the same opportunity to create more effective and efficient post-emergency supply chains, we hope this research offers insights into the process and the value of using supply and demand data to inform their decisions.