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Leveraging Complementary Distribution Channels for an Effective, Efficient Global Supply Chain

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Summary

When transportation and stock positioning decisions are well integrated, enabling the resulting distribution channels to be used in ways that leverage their strengths, the channels become complementary elements of an effective, efficient global supply chain. The Department of Defense's inventory locations and transportation channels combine to form five major distribution channels for materiel shipped from the Continental United States (CONUS) to other theaters:

- Military air with shipments consolidated at distribution centers (MILALOC).
- Military air with shipments consolidated at airports (MILAIR).
- Commercial express small package delivery or Worldwide Express (WWX).
- Ocean lift to theater inventory with theater distribution ("Surface-theater").
- Ocean lift with transshipment to the unit ("Surface-direct").

Distribution Channel Characteristics and Performance

These channels offer varying levels of service and shipping cost, as demonstrated by service to units in Iraq. MILALOC, when materiel is issued from the primary distribution center supporting a unit/theater, offers fast service at a moderate cost. The speed is similar to that of WWX, which costs much more than MILALOC in undeveloped theaters. Surface-theater also has similar speed, at about half the cost of MILALOC. So, for example, to support customers in Iraq, there are three fast channels at different transportation "price points." In contrast, when the shipment is issued from the nonprimary distribution center, MILAIR and MILALOC are slower, with moderate transportation cost. Surface-direct is very slow but also very inexpensive.

The performance and transportation costs for each channel are not alone sufficient to determine whether one channel or another should be used. Rather, there are "prerequisites" for either feasibility or effectiveness. For

MILALOC to be effective, a unit has to need enough sustainment materiel for reasonably full air pallets to be shipped to it on a frequent basis; moreover, the materiel needs to be positioned at the primary distribution center supporting the unit. Also, a small percentage of items are not eligible to be packaged for air shipment at distribution centers, precluding the use of MILALOC for these items. WWX is currently limited by contract to items 150 lbs. or less.

When considering sealift combined with centralized theater inventory, the marginal cost of additional inventory must be considered along with transportation cost. Good candidates for sustainment from centralized theater inventory with replenishment by sea are items that have a high ratio of weight (a proxy for transportation cost) to their procurement cost. Total sustainment cost is reduced when high weight-to-cost materiel is stocked in theater and replenished by ship. Thus, surface-theater and MILALOC offer similar performance but are uniquely cost-effective for different items. Finally, surface-direct is too slow and variable to be used except for cases in which delivery timing is not important or planning offers a long lead time.

Ideal Distribution Channel Roles

The combinations of performance, transportation cost, inventory cost, and conditions under which the channels are feasible and effective lead to ideal roles for each. Surface-direct is best for relatively low-cost items ordered in bulk either for time-insensitive needs or when the unit can plan far in advance. Surface-theater is the best way to provide high-volume, high-weight-to-cost items to all units in theater.¹ Time-sensitive demands for items for which it is

¹ For units in Iraq, theater inventory has not been providing a time advantage over MILALOC from the primary distribution center. Thus, it has primarily offered a transportation cost savings. However, if in another theater it were to have a time advantage, then it could be advantageous to expand the breadth of items to improve customer support effectiveness. Similarly, it can provide a time benefit for items that cannot use MILALOC from the primary distribution center or WWX. In such cases, if the item does not meet the weight-to-cost criteria for theater inventory, then it may still be beneficial to hold it in theater inventory but with air-based replenishment to hold down inventory requirements.

not cost-effective from a total cost perspective to hold in theater inventory should be sent by air from CONUS.

MILALOC is fast and relatively inexpensive and is the ideal choice for moderate- to high-volume units when stock is positioned to a large degree at the unit's primary supporting distribution center. Even for these units, though, MILALOC cannot handle all items, requiring a fallback to MILAIR. Also, some stock will not be in the right place for MILALOC customers; in this situation, WWX becomes an alternative for fast, reliable distribution. For units with low volume or stock positioning that will not support effective MILALOC, the only way to get fast, reliable distribution is WWX. For items over 150 lbs. sourced from within CONUS, though, these units then have to rely on relatively slow MILAIR.

Thus, customers get responsive distribution—fast and reliable—and total system costs are minimized when high-volume, high-weight-to-cost items are stocked in theater with replenishment by ship, most items for higher-volume customers are stocked at their supporting distribution centers, and customers plan activities involving large volumes of inexpensive materiel far in advance.

Ideal Roles vs. Current Sustainment Structure: Iraq as a Case Study

Through a gradual evolution, the sustainment structure for Iraq has moved toward this supply chain model. To illustrate this, we look at the sustainment channels serving example units representing different unit types in Iraq, and we also look at whether surface-theater is being employed for high-volume, high-weight-to-cost items.

When shipping volume from a primary distribution center in CONUS is high enough—driven by the combination of unit sustainment demand volume and stock positioning effectiveness, the best distribution choice for items shipped from CONUS to units in Iraq is MILALOC. To determine whether a unit demands sufficient volume, we first look at total volume per day. The next check is to see how much of these items in terms of weight are issued from the unit's primary distribution center in CONUS. The third check is to see how much of the materiel shipped from the primary distribution center is MILALOC-eligible. If the result of these three checks is that there is sufficient

volume for approximately daily pallets from a unit's primary distribution center, then MILALOC should be employed.

For an Army heavy brigade combat team (BCT) example, all three MILALOC criteria are fulfilled. Thus, as it should be, MILALOC is the primary CONUS channel for the BCT. Because the BCT also requests many big, heavy items, surface-theater is also an appropriate major channel.

An illustrative Army combat aviation brigade (CAB) has relatively high volume, but the stock positioning of the items it needs meshes only moderately with the use of MILALOC. So while it uses MILALOC, it is also supported with WWX for small items. WWX is its highest-frequency channel.

An illustrative U.S. Air Force base supply unit has relatively low volume and similar stock positioning at the primary distribution center as the Army CAB. This combination prevents consideration of MILALOC for this unit. Thus, the primary mode from CONUS is WWX, with MILAIR as the fallback for larger items.

An illustrative U.S. Marine Corps aviation logistics unit actually has relatively high volume, but a small fraction of its shipments in terms of weight are from the primary distribution center. This would make MILALOC ineffective. Hence, it too uses WWX as the primary mode. Unlike the other units, it does not utilize theater inventory.

The sustainment structure for Iraq also generally reflects the ideal supply chain model when viewed from an item perspective. For the top 100 items by shipping weight, most with high weight-to-cost ratios are now stocked in theater. However, forward theater inventory remains more hit and miss for the next 900 items.

Improvement Opportunities

There are near-term opportunities for improved, cost-effective sustainment by more effectively leveraging the complementary nature of the five available distribution channels.

- First, better stock positioning to improve MILALOC effectiveness and utilization would reduce overall distribution times.
- Support to MILALOC units can be improved by using WWX to ship

small, critical items not at the primary distribution center, after improving stock positioning.

- The potential for heavier WWX weight limits should also be explored to mitigate the effects of relatively slow MILAIR performance for units for which WWX is the primary channel.
- Still, there will continue to be critical, large items that demand MILAIR. Support for these items will continue to suffer unless MILAIR is improved, an alternative channel such as a special charter is established, or forward stock positioning is leveraged.
- Additionally, there remain some high-volume, high-weight-to-cost items that should be stocked in centralized theater inventory to reduce total costs.

In conclusion, the five distribution channels discussed in this report are not redundant, but rather play important, complementary roles in providing cost-effective support to soldiers, sailors, airmen, and marines around the world. With these roles well understood, all of the organizations involved in their operation and use will be better able to integrate the supply chain and determine the best paths to improved support.