Coping with Demand and Supply Uncertainty

Collaborative Forecasting

This requires a good understanding of demand variability (red items in figure 2). Sharing data and demand forecast information across supply chain players improves transparency and supply chain coordination.

Aligning Product Manufacturing and Distribution Strategies with Demand Variability

The best product manufacturing and inventory deployment strategies are based on a healthy balance of manufacturing to order and manufacturing to stock (red and purple items in figure 2). This requires:

- Knowledge of product demand uncertainties and lead times
- Alignment of incentives among manufacturers, partners, and other stakeholders

Pooling Demand and Supply Risks

A supply chain can manage demand volatility by (red and purple items in figure 2):

- Aggregating demand across multiple customers or geographical areas
- Pooling multiple suppliers to meet uncertain demand

Sharing Risk

Demand uncertainty may be unevenly distributed across stakeholders in the supply chain (e.g., extractors, API manufacturers, ACT manufacturers, funders, country governments). The risk from demand uncertainty can be shared more equitably by addressing the red, blue, and purple items in figure 2 by:

- Minimum purchase commitments
- Quantity flexibility contracts
- Buyback contracts
- Revenue sharing

Rolling Horizon Forecast/Volume Commitments

This requires that funding agencies commit to manufacturers to purchase a certain quantity of the product over time (red, blue, and purple items in figure 2). Manufacturers will then:

- Guarantee a maximum lead-time and upside purchase flexibility with defined contractual penalties
- Provide discounted, low acquisition costs
- Be incentivized by guaranteed minimum quantities
- Be inclined, with donors, to share demand uncertainty risk

Global Supply Hubs/Physical Buffer Stock

These can be manufacturer-held buffer stocks, rotating product buffers, and non-rotating emergency buffers (red, purple, and green items in figure 2).

- Short lead-times, enabling rapid response
- Discounted pricing
- Financing of initial stockpile with a rolling working capital fund that is replenished when orders are placed
- Rotating stocks
- Challenging to implement
- Manufacturers incentivized by guaranteed minimum quantities
- Low risk of product expiry
- Depends on the stockpile and all orders are emergencies
- Non-rotating emergency stocks
- Easy to establish
- Balance of demand and excess stock will incentivize manufacturers to not under-forecast and to share information
- High risk of expiry if the amount of stock is not estimated properly

Financial Buffer Funds

Bridge funds that countries can deploy for procurement (addressing the red and blue portions in figure 2):

- Holding buffer stock across multiple manufacturers requires multiple shipments
- Unfinished product allows maximum shelf life

Table 1. Snapshot of Options

<table>
<thead>
<tr>
<th>Management Area</th>
<th>Rolling Horizon Forecast</th>
<th>Collaborative Forecasting</th>
<th>Aligning Product Manufacturing and Distribution Strategies</th>
<th>Financing Stockpile</th>
<th>Procurement Commitments</th>
<th>Physical Buffer Stock</th>
<th>Financial Buffer Funds</th>
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</table>

Conclusion

A mix of strategies is required to stabilize the artemisinin and ACT markets.

- Share information across the supply chain; mechanisms are needed for better information sharing among farmers, extractors, and manufacturers
- Use forecast commitments to enable manufacturers to keep larger amounts of inventory at each stage of the production cycle
- In the short and medium terms, apply physical and financial buffers; buffers of finished products will facilitate stable inventory and financial buffer funds will address funding disruptions
- In the medium to long terms, create a voluntary standard for extractors to ensure appropriate purchasing and sales practices, minimum quality and ethical standards, and homogeneity in the quality of raw material
- Use collaborative forecasting to understand the global supply and demand and to match product manufacturing and distribution strategies
- Pool demand and supply risks through rolling volume commitments and better contracting to allow risk sharing among stakeholders and a more predictable supply
- In the long term, make significant investments in country-level system strengthening to minimize demand uncertainties