

Global Supply Chain Logistics Challenges for HVM

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Jenny Tan

Director, Micron Technology

Global Front End Materials Operations

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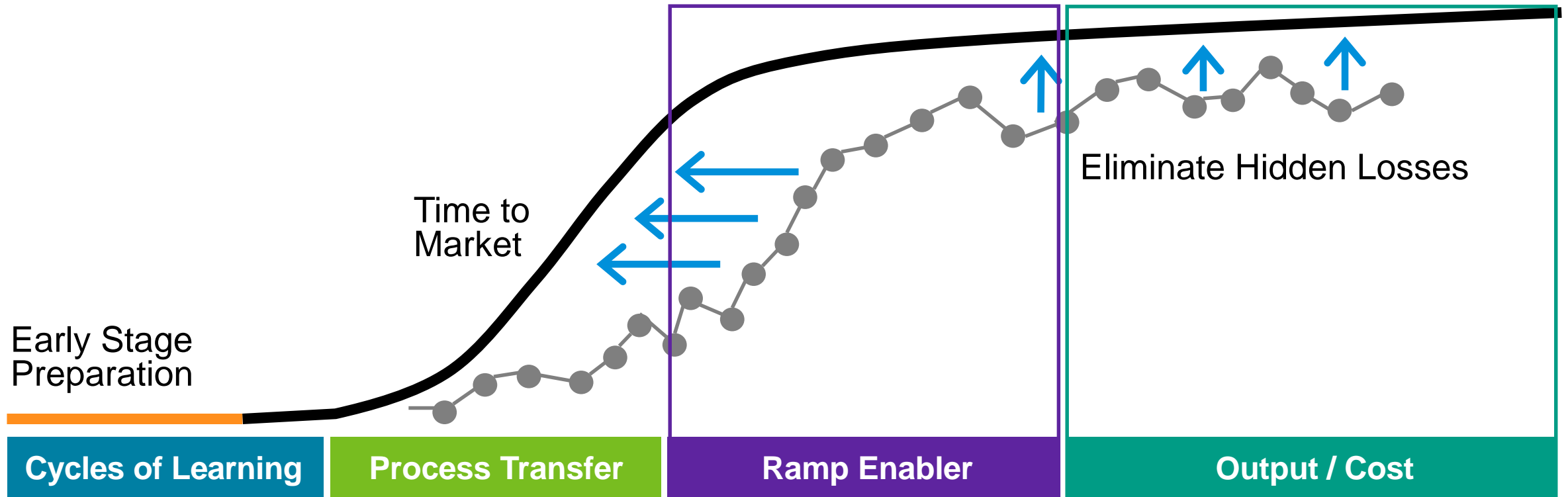


Global Scale and Manufacturing Excellence

We deliver comprehensive customer collaboration, support, and quality throughout the product lifecycle and around the world.

Accelerating End-to-End Solutions

Fab Manufacturing Engagement With Materials Suppliers



HVM Fab Material Supply Chain Deliverables



HVM Fab Supply Chain Logistic Challenges for DG Materials



Freight Mode

- Sea only, long lead time
- Consolidation of shipping lines to 3 alliances (limited option, flexibility, eg: Hanjing bankruptcy)



Warehousing

- Limited local and offsite
- Regulatory - Permits, Importer of records (IOR)



Product Characteristics

- Short shelf life
- Temperature controlled
- Compatibility restriction



Geo Political Issues

- Trade wars
- Qatar Helium



Geographical Challenges

- Earthquake, typhoons

HVM Fab Material Supply Chain Logistic Challenges

**Materials Lead Time
Reduction**

**Robust Inventory
Management**

**Consistent
Quality Performance**

Logistics planning and execution is critical to enable material availability.

- Agility of supply to respond fast to volume increases
- Materials inventory management with ease of dispatch across geographies
- Traceability and adequate controls at each stage to deliver stock with Consistent Quality Performance
 - Export/Import Transportation controls
 - Warehousing controls
 - Local delivery controls

Material lead times can span from 6-12 months.



Transferability

Traceability of Materials

- Using big data to link and monitor end-to-end inventory and parameters
- Visibility to customers up to container level
- Locate materials globally

Dispatch across geographies

- Enablement of import/export paths
- Review procedures to reduce cycle time

A photograph of two workers in white cleanroom suits and masks, standing in a semiconductor manufacturing facility. They are looking at a tablet together. The background shows complex machinery and equipment.

Scalability

Ability to scale up supply for high volume manufacturing, with consistent quality performance.

Assets investment and management

Import/Export, Transportation, Storage Permits

- Approvals – METI, EPA, NEA/MHD

Storage planning

Business continuity planning

- Raw material sourcing
- Manufacturing location diversification
- Supplier change control management to minimize impact to customers

Case Study

| | Chemicals Transferability | Specialty Chemicals/ESG Transferability/Scalability | Specialty Chemicals/ESG Transferability/Scalability |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------|
| Issue | OEM works with different distributors at different countries. No business relationship between distributors. Any transfers need to go through multiple transactions between companies | | |
| Importance | Deters speed of diversions to prevent run outs/ optimize inventory | Deters speed of diversions to prevent run outs/ optimize inventory | Deters new business opportunities/hinder evaluations/start up |
| Remedy | Optimize distributors' network, offsite stocking strategy (eg: logistic hubs) | | |
| Supplier Impact | Reduced business opportunities across the geographies | Loss of business | Loss of business |

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| Issue | OEM works with different distributors at different countries. No business relationship between distributors. Any transfers need to go through multiple transactions between companies | Suppliers encounter challenges in stock checking and inventory assessment at globally sited warehouses, leading to delay in mitigation plans. | Unable to bring in an Asian source into US fast due to TSCA/LEV |
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Summary



Upgrade, integration of inventory management systems with traceability of materials for consistent quality performance



Proactive to identify and enable key inventory diversion routes and improve stocking strategies



Proactive planning and review of Global market and BCP with customers



Early assets preparation, production planning, authorities' engagements (permit) to shorten material lead time

