

# Supply Chain Economics of Reusable Shipping Containers



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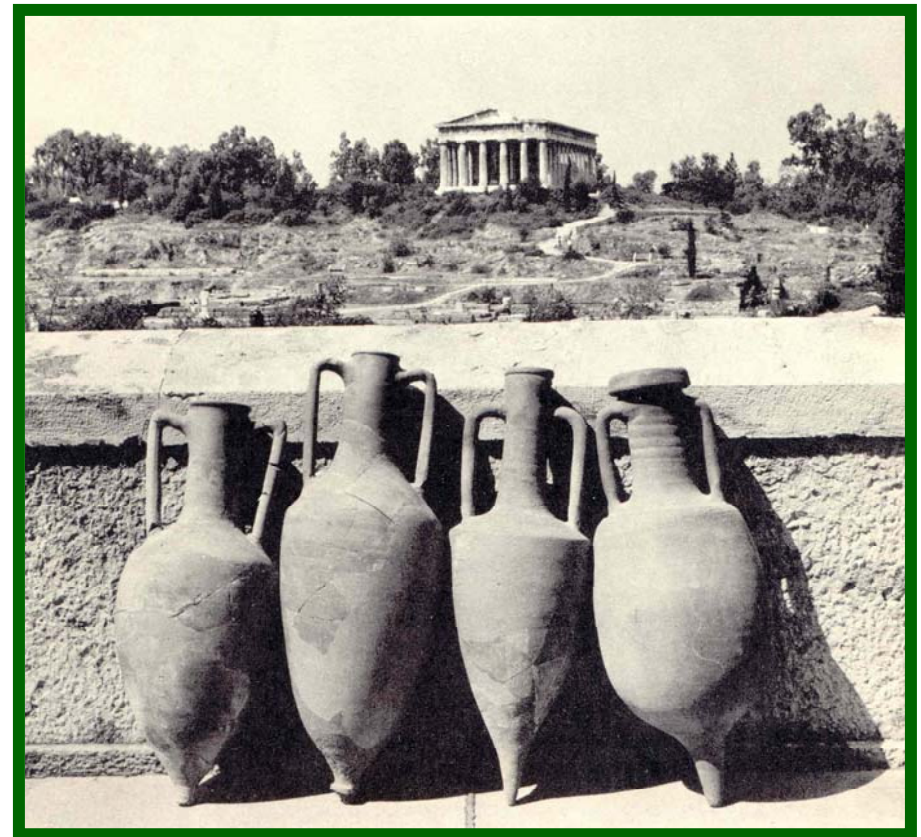
# Supply Chain Issues

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- Who benefits?
  - Total system cost may be lower
  - Customer reaps most of the benefit – no waste
- Who pays?
  - Package buyers
    - (may be less than expendable... it depends)
  - Reverse logistics buyers

# Universal Principle: Humans have always reused shipping containers

- Ancient transport amphorae
- Wooden casks
- Tea chests
- Pallets
- Corrugated boxes (at least we reuse the fibers)
- And now RPCs



# A well organized supply chain is required

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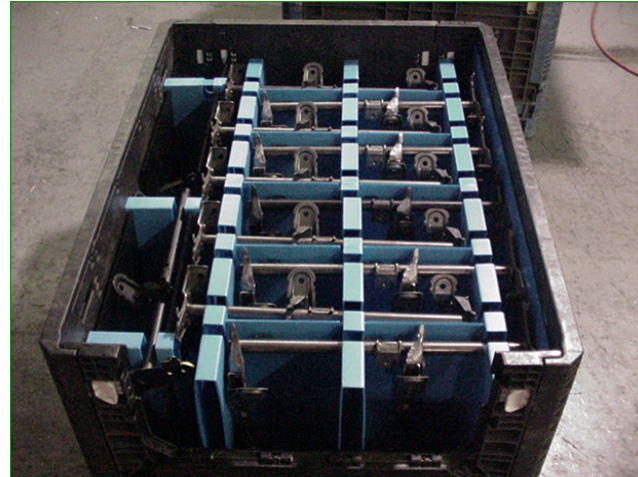
- Strong lead organization  
(usually a customer)
- Contractual relationships
  - responsibilities are negotiated
- Appropriate physical cycle
  - Short cycle time
  - Little variation in cycle
  - Short distance
  - Network rather than exchange

# Logistics Trends Favor Reusable Packaging

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- JIT: shortens cycle
- SCM: increases interfirm management
- 3PL: specialist functions

# US Automobile Manufacturers



# UK Grocery Retailers for Produce



# US Automobile Manufacturers and UK Grocery Retailers

- Powerful customers, channel leaders
- Well managed supply chain
- Short (time & distance) cycle
- 3PL network container management
- Industry association formed standards



# Container Management

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- User-owned systems lack control
- Identification problems
- Tracking problems
- Great expectations for RFID

# Third Party Partnerships

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- Consistent with supply chain management trends
- Service alternatives
  - lead logistics provider
  - container management company
  - container rental
  - container cleaning

# Financial Evaluation

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- Compare returnables to expendables
- Full system, not just individual suppliers
- Investment, not expense
  - Unless you are renting them

# We Love NPV

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- Net present value
- Profitability estimate
- All cost flows
- Discounts future \$ for life of project
- Allows fair comparison of alternative investments

# We Love NPV

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- Payback period is intuitive but does not consider profit beyond the period
- IRR/ARR do not estimate profitability either

# NPV vs Payback Period Example

- \$100,000 investment, \$50,000/year savings
  - 2 year payback
  - Containers last 12 years
  - $\text{NPV} = \$500,000 \times \text{discount rate}$
- \$50,000 investment, \$50,000/year savings
  - 1 year payback
  - Containers last 1 year
  - $\text{NPV} = \$0$

# Cost Flows

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Initial investment depends on

- Cycle length and variation
- Standardization and interchangeability

Replacement cost depends on durability and security

# Cost Flows

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Savings over expendable packaging:

- Daily purchase
- Disposal – unless recycling of expendables is profitable

# Cost Flows

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## Operational Costs

- Return transport
  - depends on contract terms, interchangeability and network
- Storage / sorting space
- Handling
- Cleaning
- Container management / tracking

# Other Positive Cost Flows

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- Investment tax credit
- Housekeeping benefit
- Lean production benefits
- End of life value for recycling

# Technical Issues Affect Costs

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- Durability = replacement cost
- Ergonomics = handling cost
- Dimensions = transport cost
- Flammability = insurance cost
- Sanitation = cleaning cost

# Durability

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- ISTA & ASTM Performance Testing Standards
- Simulation tests
- Damage reproduction tests
- Not so straightforward as expendable package testing

# Ergonomics for Manual Handling

- $RWL = 51 \text{ lbs} * HF * VF * DF * FF * AF * CF$
- RWL = Recommended weight limit
- HF = Horizontal factor (extension)
- DF = Distance lifted
- FF = Frequency of lifting
- AF = Asymmetry, twisting
- CF = Coupling factor (grip)
- $RWL < 30 \text{ lbs}$ , width  $< 16''$

# Ergonomics

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- Hand holes
  - power grip
  - at least 3" x 4.5"
  - 2" clearance
  - 0.43 thick
  - smooth but not slippery

# Dimensions

- Modular sizes to reduce wasted cube
  - Pallet footprint
  - Trailers and containers
  - Distribution center racks
- Return ratio less than full to minimize return transport costs
  - Nest, sloped sides, knock down
  - Sequencing and inventory cost in saving for full truckload
    - Some, like Toyota prefer straight sided with 1 for 1 swap:  
KANBAN

# Flammability

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- Higher insurance rates for RPCs
- Insurance rates depend on sprinkler coverage

# Cleaning / Sanitation

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- Auto industry concerned with clean trim parts
  - GM keeps containers for “clean” parts separate
  - Some hand washing

# Cleaning / Sanitation

- Grocery retailers concerned with bacteria
  - containers washed after every use
  - strict quality standards



# Cleaning Options

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- Do-it-yourself
  - hand wash
  - commercial machine
- 3rd Party Service

# Reusable Shipping Containers: A Profitable Investment--or a Costly Mistake?

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- It depends!
- Do your homework, include all cash flows for the life of the project
- Evaluate alternative package styles
- Evaluate alternative logistics
- Consider entire investment

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