

# Carrying Cost in EIS



# Carrying Costs do impact Inventory

---

- Inventory Carrying Cost, or Inventory Holding Cost, is the effective “interest rate” at which inventory costs are carried
- Inventory Holding Cost has both Financial and Operational components
- Tax effects should be considered in calculating Inventory Holding Cost
- Inventory Holding Cost has a significant impact on Inventory Optimization
- Item- and Location- Specific Inventory Holding Cost can be much higher than the cost of other forms of Working Capital

# Fundamentals and Key Factors

---

## Categories of Inventory Carrying Cost

- Capital or Financial costs: Working Capital
- Non-Capital, or Operational costs
- Taxes and other interesting ramifications



Cost of Capital



Operational Costs



Considering  
Tax Effects



# Capital Cost Overview

---

- Inventory is an investment, and alternative investments exist!
  - Alternatives may carry more risk than a savings account or market investment
  - A greater rate of return may be expected compared to a risk-free investment
    - Getting a loan from the bank may “only” cost 4% interest
    - An investment in new plant equipment may return a 100% rate in 9 months

... so why aren't we taking all the loans, and making all the “good” investments we can?

- Corporate “Propensity for Risk”
- Limits on credit line
- Practical financial limitations

We need some way of averaging our cost of capital in light of alternatives



# Capital Cost: WACC and Hurdle Rate

WACC: Weighted Average Cost of Capital, a weighted average of:

- Financial return expected by shareholders (cost of Equity)
- Interest rate on Debt (cost of *current* Debt)
- Debt / Equity ratio
- Risk

Example: A company's shareholders expect an 11% return. The company's cost of debt is 5%, with a D/E ratio of 30:70 and a 40% Corporate tax rate.

$$\text{WACC} = (11\% * 70\%) + [5\% * 30\% * (100\% - 40\% \text{ tax rate})] = 8.6\%$$

cost of equity

cost of debt

Note that cost of equity is considered after-tax!

The before-tax Cost of Capital is therefore 14.3%. (8.6% / 60%).



# Non-Capital Inventory Carrying Costs



In addition to Capital costs, inventory incurs before-tax Operational costs. These may be readily available given the component-level data, but are rarely as well considered as the cost of capital!

- Storage and Warehousing costs (direct fees)
- Risk costs: Obsolescence, Pilferage, Shrinkage, Damage
- Insurance, other Taxes
- Administrative and Other

Non-capital carrying costs can range from 5 to 30+% of the cost of inventory!

# Inventory Carrying Cost: Good, Better, and Best Practices

---

Good practice: Inventory Holding Cost at all locations is carried at WACC

- + Considers inventory as an investment
- + Considers inventory investment cost against alternate investments
- + Easy to implement, defend, discuss, and calculate
  
- Cannot consider Operational costs of carrying inventory (storage costs)
- Cannot consider Risk, Obsolescence, Spoilage, etc..
- Does not allow for item- or location-specific situations
- Often is not corrected for tax effects (corporate taxes, other taxes)

# Inventory Carrying Cost: Good, Better, and Best Practices

---

*Better* practice: Carry inventory at WACC + *Average* Operational Costs

This has the advantages of WACC, plus

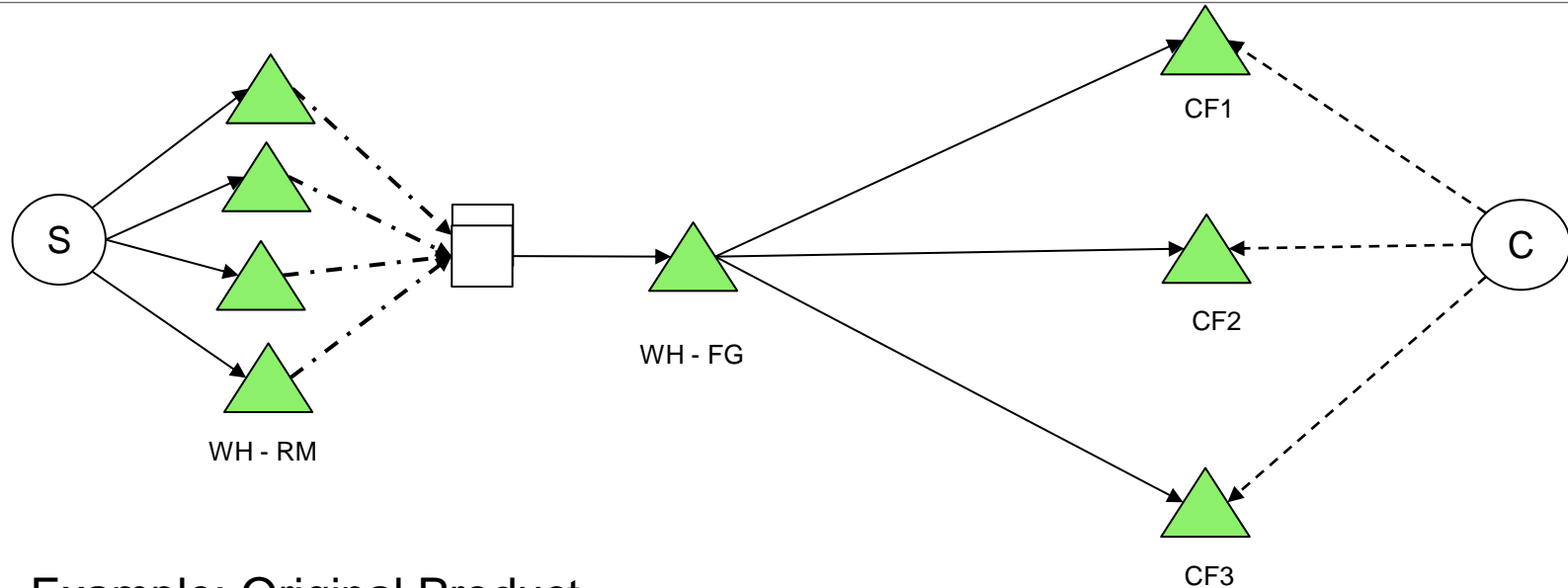
- + Considers Operational costs, but in a basic way
- Operational costs require research and calculation
- Average operational cost per unit or location may not equitably spread costs to the items / locations that incur those costs

*Detailed* practice: Use WACC + Operational Costs *by Item and Location*

- + Considers very real differences between items and locations
- + Allocates costs “fairly”, depending on level of data available
- Requires research, calculation, maintenance



# Inventory Carrying Cost: Impacts



Example: Original Product

Base : 15% Storage Cost at all locations

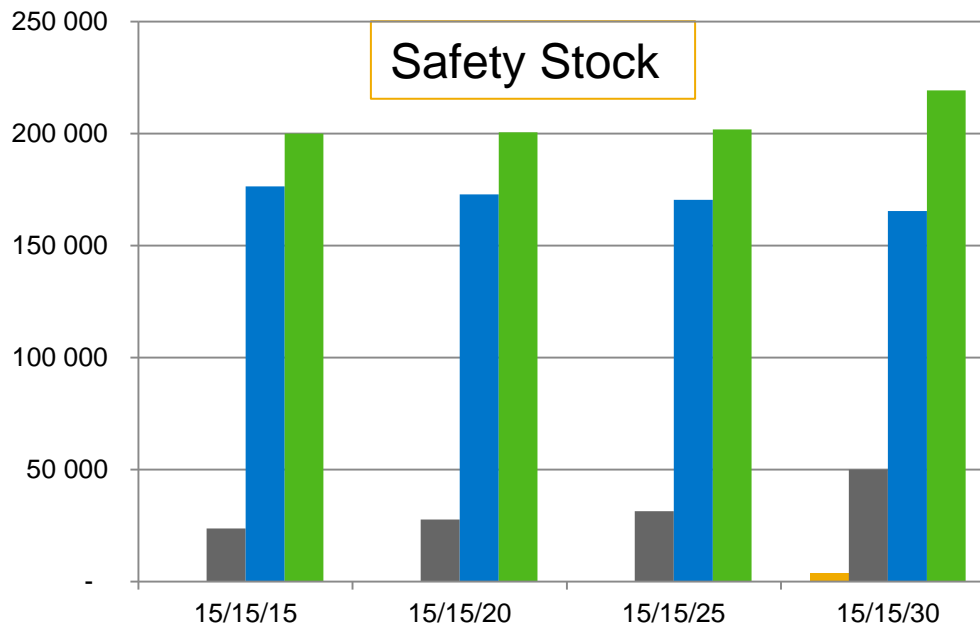
Case 1: 15% RM, 15% FG, 20% CF

Case 2: 15% RM, 15% FG, 25% CF

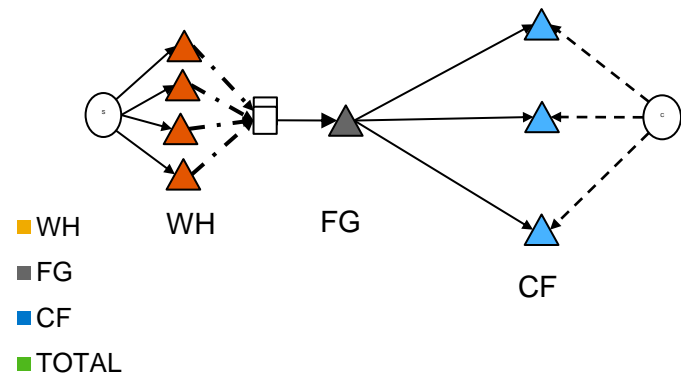
Case 3: 15% RM, 15% FG, 30% CF

# Increasing Downstream Carrying Costs

- Increasing downstream Carrying Cost downstream moves Safety Stock upstream, away from high cost nodes



	15/15/15	15/15/20	15/15/25	15/15/30
<b>Safety Stock</b>	<b>15/15/15</b>	<b>15/15/20</b>	<b>15/15/25</b>	<b>15/15/30</b>
WH	-	-	-	3,901
FG	23,678	27,675	31,382	50,033
CF	176,321	172,829	170,417	165,319
<b>TOTAL</b>	<b>199,999</b>	<b>200,504</b>	<b>201,799</b>	<b>219,253</b>



# Inventory Carry Cost Intuitions

---

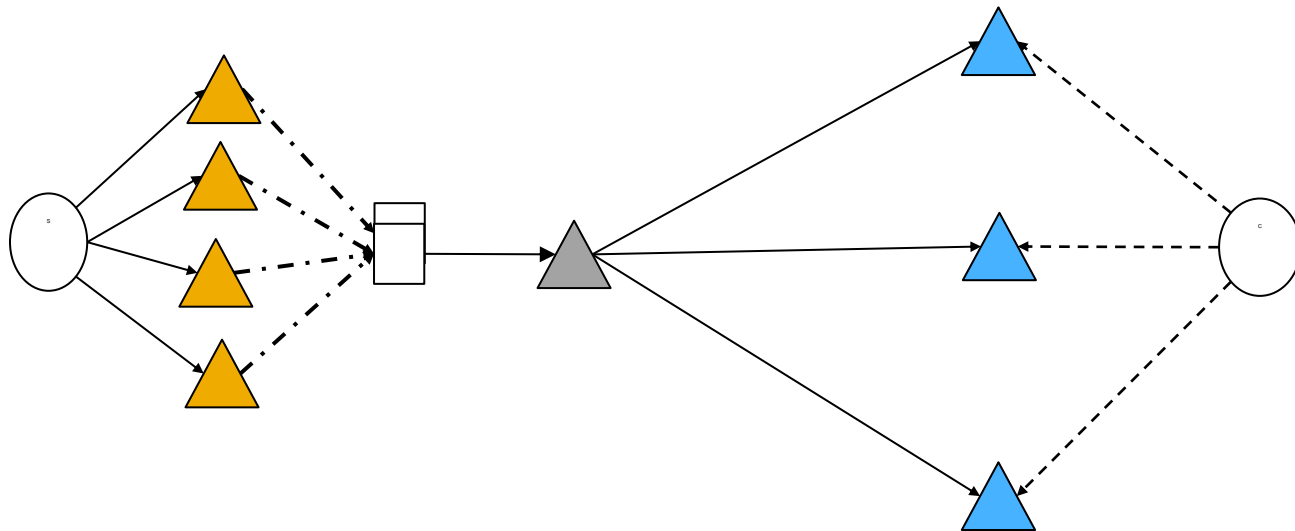
- Inventory Carrying Cost is more than simply the financial costs of carrying Working Capital. Operational Costs must be used to better manage safety stock distribution in a supply chain
- Since Operational Costs differ by item and location, these differences can be accounted for in the optimization
- Better practice in calculating inventory holding cost considers tax effects (before tax, or after tax)
- SAP's solution has the capability of considering item-location-specific inventory holding costs in the optimization.

# Inventory Carrying Cost: Good, Better, Best Practices

Good: Consider proper WACC

Better: WACC + Operational Costs

Detailed: WACC + Operational Costs  
specific to item and location



SAP EIS Customers use 8-29% (informal poll)



**Thank you**

# © 2014 SAP AG or an SAP affiliate company. All rights reserved.

---

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP AG or an SAP affiliate company.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG (or an SAP affiliate company) in Germany and other countries. Please see <http://global12.sap.com/corporate-en/legal/copyright/index.epx> for additional trademark information and notices.

Some software products marketed by SAP AG and its distributors contain proprietary software components of other software vendors.

National product specifications may vary.

These materials are provided by SAP AG or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP AG or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP AG or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP AG or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP AG's or its affiliated companies' strategy and possible future developments, products, and/or platform directions and functionality are all subject to change and may be changed by SAP AG or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of their dates, and they should not be relied upon in making purchasing decisions.