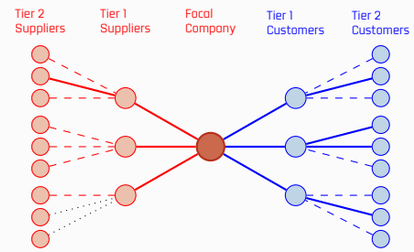
SCMx1

TITLE 1

What is a Supply Chain?

Network Model



In a manufacturing context, a supply chain can be seen as a network of suppliers, manufacturers, distributors, and retailers.

What is Supply Chain Management?

SCM Activities

Product-Process Matrix/Cube

Customer Order Decoupling Point

Flows

Materials Flow

Subsubtitle 2

Inventory: Concepts & Methods

Inventory

Accouting PoV vs. Logistics/SCM PoV

Why hold inventory?

- Cover process time
- Decouple process

Inventory decisions

Inventory Costs

Total Cost & Total Relevant Cost

Purchase cost
Ordering/Setup cost
Holding cost
Stockout cost: Can be modeled using stockout event or units short

Total Inventory Cost & Total Relevant Cost

$$\text{TC} = \text{Purchase Cost} + \text{Ordering Cost} + \text{Holding Cost} + \text{Shortage Cost}$$

$$TC = cD + c_t\frac{D}{Q} + c_e\frac{Q}{2} + c_s E \text{[Units Short]}$$

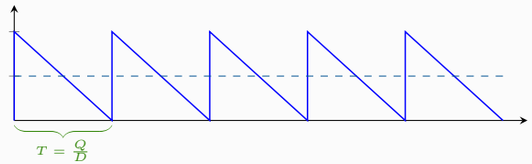
Procurement activities have influence on the Purchase Cost, while Inventory Management activities have influence on the other costs.

Inventory: Deterministic Models

EOQ

EOQ plot

Q units of inventory each T units of time.
Senalar (annotate) la demanda como ratio/pendiente, el nivel Q y Q/2, etc —> OneNote 4.2. EOQ



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EOQ formula derivation

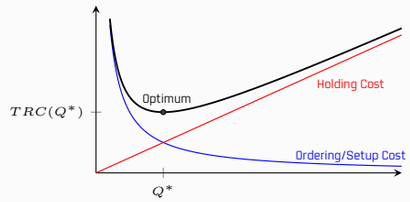
Since demand is deterministic, we can get rid of the Stockout Cost concept for now. So,

$$TRC(Q) = c_t\frac{D}{Q} + c_e\frac{Q}{2}$$

From the first-order optimal condition (first derivative equals zero), we have

$$0 = \frac{\mathrm{d}}{\mathrm{d}Q}\left(\frac{c_t D}{Q}\right) + \frac{\mathrm{d}}{\mathrm{d}Q}\left(\frac{c_e Q}{2}\right)$$
$$0 = -\frac{c_t D}{Q^2} + \frac{c_e}{2}$$
$$\boxed{Q^* = \sqrt{\frac{2c_t D}{c_e}}}$$

The EOQ or Q^* gives the minimum Total Relevant Cost under deterministic conditions.



EOQ formula derivation

EOQ formula:

$$Q^* = \sqrt{\frac{ABC}{D}}$$

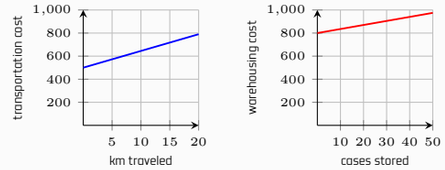
Appendix 1

Mathematical Functions

Linear Functions

$$f(x) = mx + b$$

Cost functions: $f(\text{Level of Activity}) = \text{Fixed Cost} + \text{Variable Cost(Level of Activity)}$



Linear Regressions
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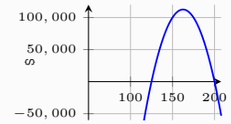
Quadratic Functions

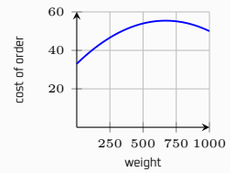
$$f(x) = ax^2 + bx + c$$

Profit:



$$V(p) = 20,000 - 80p$$
$$R(p) = (20,000 - 80p)p$$
$$C(p) = 500,000 + 75(20,000 - 80p)$$
$$P(p) = R(p) - C(p)$$

Parcel trucking



$$f(w) = 33 + 0.067w - 0.00005w^2$$

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