

# Total Ownership Cost

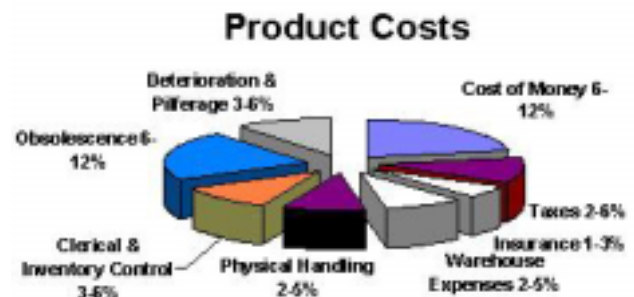
Buyers often have to make decisions on price breaks or quantity discounts in order to purchase products for resale or manufacturing at the best possible price; but what is the best price? The lowest actual unit cost is the best price, but is it the lowest **Ownership Cost** for your company? The quantity purchased has to be held in inventory, handled by your labor force, paid for, and will take up precious space in your warehouse. What does this cost? The concept of **Total Ownership Cost** will help us understand the real cost of inventory.

If you have ever purchased a product, whether for home or business, you know that traditionally as the quantity purchased increases, the price per unit decreases. This is referred to as a volume discount, a quantity discount, or a price break. As a purchasing agent, you know that if you purchase a larger quantity of a specific product, you can get a discount, whether it be based on a case, a pallet, or a truckload.

The purchase price is not the only cost involved in purchasing material for resale, wholesale, or manufacturing. In order for a business to have products in inventory, there are costs associated with these products based on the following:

## Capital Costs

Capital Costs are investment and opportunity costs. Inventory is an asset, and should be treated as such. If an investment is made in inventory, the company should reap a return on the investment. If cash is tied up in inventory, then it cannot be used for other investments, or the repayment of debt. If you had less inventory, what could you do with the available capital? Is the inventory investment working as well as a portfolio with the same value would?



This graph represents the pieces associated with inventory carrying cost. These costs were calculated for the Council of Logistics Management in 1996.

## Inventory Service Costs

A business pays its labor force to receive inventory, to put inventory away, and to ship inventory; these are the physical handling costs associated with inventory. There are also taxes paid on inventory, and insurance premiums are based on value of assets, or inventory levels kept on hand. If your inventory level decreases, would you need the same size workforce to manage it? Could a cheaper insurance policy be negotiated if assets levels decreased?

## Storage Space Costs

Inventory is located in Distribution Centers, Plant Warehouses, Public Warehouses and Rented Warehouses. The costs of these facilities are in direct relation to the amount of inventory held in

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these locations and the amount of space goods occupy. If you could move to a smaller warehouse, or DC, how much money could you save the company annually? Would you be able to decrease the amount of space required to handle inventory by purchasing more economical quantities?

## *Inventory Risk Costs*

Inventory kept for a time frame over its useful life makes it obsolete. Inventory can be damaged in storage, with relocation, or with handling goods multiple times. Inventory is also prone to shrinkage. These costs must also be associated with carrying inventory. Is the inventory that you have on hand what your customers want and need?

As you can see, as inventory increases, operating costs also increase. Inventory carrying cost have been estimated anywhere from 15% to 55% of the average inventory value, depending on the type of industry. Most logistics professionals use a carrying cost of 25% as a standard. This carrying cost associated with inventory is rarely thought of when pricing out SKU's to be held in inventory. Take a look at this typical quantity discount purchase strategy.

ABC Company has an opportunity to buy SKU 1234 at a discount based on the following quantity discount brackets:

Quantity Purchased	Unit Cost	Discount Percentage
1	\$ 25.00	0.00%
25	\$ 24.50	2.00%
50	\$ 24.25	3.00%
100	\$ 24.00	4.00%
250	\$ 23.75	5.00%
500	\$ 23.50	6.00%

Which is the best price? If you said that the \$22.50 is the best price, how do you know? How much room do you have for the SKU? Is this product going to be replaced in the near future with a newer model? How many are sold in a year? How many should be held in inventory? Thinking about these types of questions will put you on the right track.

Let's say that ABC sold 2,500 of this SKU last year, and orders them 10 at a time. Based on the order quantity, the unit cost is \$25.00. Can they save money by changing the buying strategy? With this information, let's calculate some needed information:

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Quantity Purchased	Unit Cost	Dollars Per Purchase	Purchases Per Year	Dollars Per Year	Cycle Stock in Units	Cycle Stock In Dollars
1	\$ 25.00	\$ 25.00	2500	\$62,500.00	0.5	\$ 12.50
25	\$ 24.50	\$ 612.50	100	\$61,250.00	12.5	\$ 306.25
50	\$ 24.25	\$ 1,212.50	50	\$60,625.00	25	\$ 606.25
100	\$ 24.00	\$ 2,400.00	25	\$60,000.00	50	\$1,200.00
250	\$ 23.75	\$ 5,937.50	10	\$59,375.00	125	\$2,968.75
500	\$ 23.50	\$11,750.00	5	\$58,750.00	250	\$5,875.00

1. The *Quantity Purchased* is based on the bracket discounts.
2. The *Unit Cost* is based on the bracket discounts.
3. The *Dollars Per Purchase* is the *Quantity Purchased* times the *Unit Cost*.
4. The *Purchases Per Year* figures are calculated by dividing the Annual Usage (2,500) by the *Quantity Purchased*.
5. *Dollars Per Year* is calculated by multiplying *Unit Cost* times Annual Usage (2,500).
6. *Cycle Stock* is the average number of SKU's in inventory. Therefore, *Cycle Stock in Units* is 1/2 of the *Quantity Purchased*.
7. *Cycle Stock in Dollars* is the *Cycle Stock in Units* times the *Unit Cost*.

As you can see, the total annual volume in dollars decreases as the purchase quantity increases. Now look at what happens to *Carrying Costs* as the purchase quantity increases:

Quantity Purchased	Unit Cost	Dollars Per Year	Cycle Stock in Units	Cycle Stock In Dollars	Total Inventory Carrying Cost	Total Annual Cost of Ownership
1	\$ 25.00	\$62,500.00	0.5	\$ 12.50	\$ 3.13	\$62,503.13
25	\$ 24.50	\$61,250.00	12.5	\$ 306.25	\$ 76.56	\$61,326.56
50	\$ 24.25	\$60,625.00	25	\$ 606.25	\$ 151.56	\$60,776.56
100	\$ 24.00	\$60,000.00	50	\$1,200.00	\$ 300.00	\$60,300.00
250	\$ 23.75	\$59,375.00	125	\$2,968.75	\$ 742.19	\$60,117.19
500	\$ 23.50	\$58,750.00	250	\$5,875.00	\$1,468.75	\$60,218.75

1. The *Total Inventory Carrying Cost* is 25% of the *Cycle Stock in Dollars*. We are using a 25% Inventory Carrying Cost as an example.
2. The *Total Cost of Ownership* is the *Dollars Per Year* plus the *Total Inventory Carrying Cost*.

Now we have an annual figure that includes what our company uses as a Carrying Cost associated with inventory. Based on this cost of ownership, we can calculate the **Total Ownership Cost** and **Unit Ownership Cost**:

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Quantity Purchased	Unit Cost	Total Inventory Carrying Cost	Total Annual Cost of Ownership	Inventory Carrying Cost Per Unit	Unit Ownership Cost
1	\$ 25.00	\$ 3.13	\$62,503.13	\$ 0.0013	\$ 25.001
25	\$ 24.50	\$ 76.56	\$61,326.56	\$ 0.0306	\$ 24.531
50	\$ 24.25	\$ 151.56	\$60,776.56	\$ 0.0606	\$ 24.311
100	\$ 24.00	\$ 300.00	\$60,300.00	\$ 0.1200	\$ 24.120
250	\$ 23.75	\$ 742.19	\$60,117.19	\$ 0.2969	\$ 24.047
500	\$ 23.50	\$1,468.75	\$60,218.75	\$ 0.5875	\$ 24.088

1. The *Inventory Carrying Cost Per Unit* is the *Total Inventory Carrying Cost* divided by the Annual Usage (2,500).
2. The *Unit Ownership Cost* is the *Unit Cost* plus the *Inventory Carrying Cost Per Unit*

As you can see, based on the annual usage, the lowest Total Ownership Cost per unit is achieved by purchasing this SKU in lots of 250, with an ownership cost of \$24.047 each.

This concept can be used whether discounts are given in percentages, or prices. This application is also useful for determining buying strategies for vendors that offer annual volume discounts, total purchase order discounts, truckload discounts, pallet discounts, case discounts, or any other type of bracket pricing. This concept is especially useful for trade shows to examine if the "specials" that vendors are offering are really "specials" for your company.

Inventory carrying cost is an important concept in determining the best overall purchasing strategy. As the example indicates, the higher the inventory carrying cost, smaller purchase quantities achieve the highest cost efficiency. Total Ownership Cost should be used instead of the actual bracket pricing, to examine the actual overall cost to your company. Make sure that you are buying products at the overall lowest Total Cost of Ownership.