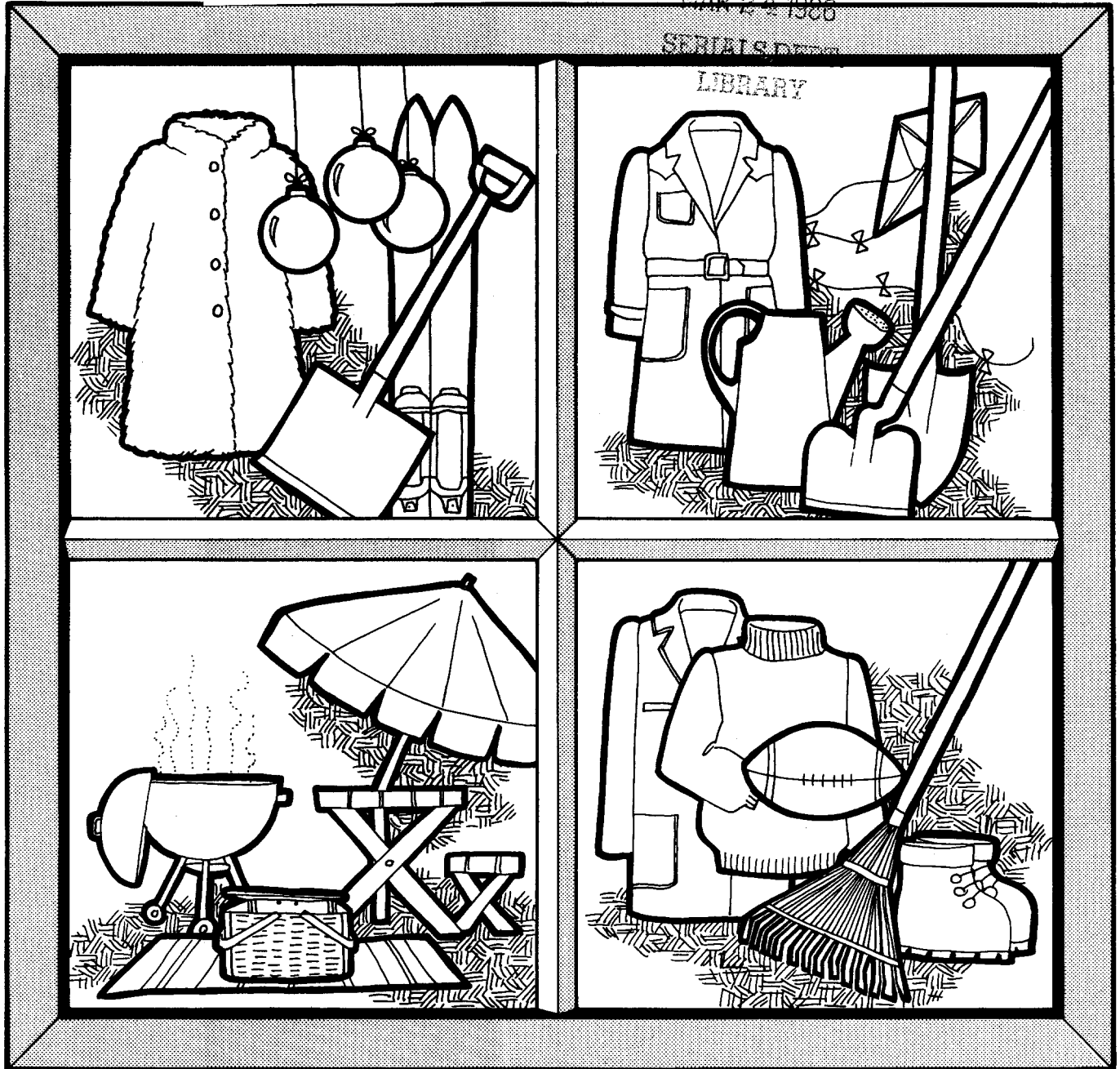




MAR 24 1986

SERIALS DEPT

LIBRARY



S
544.3
V9
8x
10.878

Inventory Control Guide for Small Business

Dale Zetocha
Small Business Management Specialist



Table of Contents

Introduction	1
Inventory Records	1
Inventory Carrying Costs	1
Inventory Control Analysis	3
Inventory Turnover Analysis	3
Average Inventory Supply	5
Gross Profit Analysis	5
In-Depth (Profit per Square Foot Analysis)	6
Inventory Level Control	7
80/20 Rule	7
ABC Analysis	8
Inventory Control Systems	9
Perpetual Inventory System	9
Two-Bin System	10
Inventory Stock Level	10
Physical Inventory	11
Sales Forecasting	11
Staple Items	11
Seasonal Items	12
Style Items and Perishable Items	12
Suppliers	12
Price	13
Quality	13
Reliability	13
Services	13
Accessibility	13
Quantity Discounts	13
Merchandise Replacement	14
Inventory Control Recommendations	15
Summary	16
Acknowledgement	16
References	17

Many small businesses serving rural areas experience cash flow problems and low profits, especially as a result of farm financial problems and the declining rural customer base. Good inventory management and control can improve the cash flow and profitability and in some cases make the difference between success or failure of the business.

The purpose of controlling inventory is to provide maximum service to the customer at the lowest cost to the business. However, inventory control is one of the more confusing and complex areas of operating a business. Too much inventory ties up capital and increases carrying costs. Too little inventory leads to lost sales and customer dissatisfaction. Inventory that is out of season or out of style can eat up profits because of high carrying costs.

There are few clear cut answers to these complex management areas because there is a great deal of variability in inventory, not only by type of business but within individual businesses. However, with proper planning, business people can concentrate on the fastest moving and most profitable product lines, obtain quantity discounts, ensure timely delivery of orders, and minimize costs, interest charges and theft losses. The purpose of this publication is to outline proven techniques for effective inventory management.

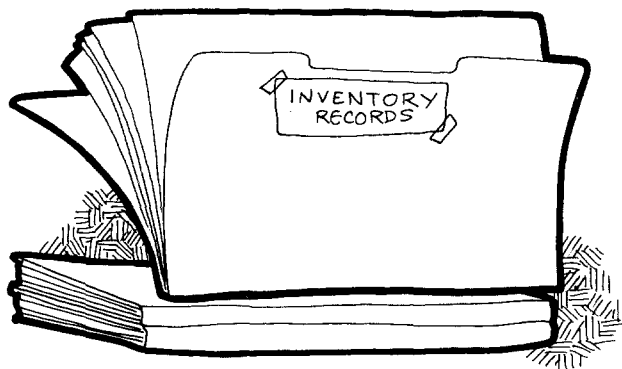
Inventory Records

Current and accurate inventory records form the basis for developing a more efficient and profitable inventory management system. Businesses usually develop monthly income statements and the following information must be available to determine the cost of goods sold:

- Cost of beginning inventory,
- net cost of goods purchased during the period, and
- cost of ending inventory.

The inventory can be further analyzed by identifying and controlling carrying costs; using inventory control analysis techniques such as inventory turnover, average monthly supply, and gross profit analysis; using various inventory level control and monitoring techniques; and employing astute purchasing practices. The use of good inventory records and these analysis techniques will assist in making the following decisions:

- Purchases for inventory replenishment.
- Scrapping or clearing out obsolete items that are no longer in demand.
- Adding new items to inventory.



Inventory Carrying Costs

A retailer must be certain that the profits (benefits) received from carrying inventory exceeds the cost. Many operating expenses and overhead costs are directly associated with inventory. Overhead costs are usually figured on an annual basis and are expressed as a percentage of sales. Some of the expenses that are directly related to or vary with inventory include the following:

- The interest paid on the loan to purchase inventory or the rate of return (profit) you could earn on your own cash invested in inventory. Both factors will increase in dollars as the size of inventory increases.
- Shoplifting, employee theft and obsolescence, which usually increase as inventory increases.
- Insurance on inventory, which may increase as inventory increases.

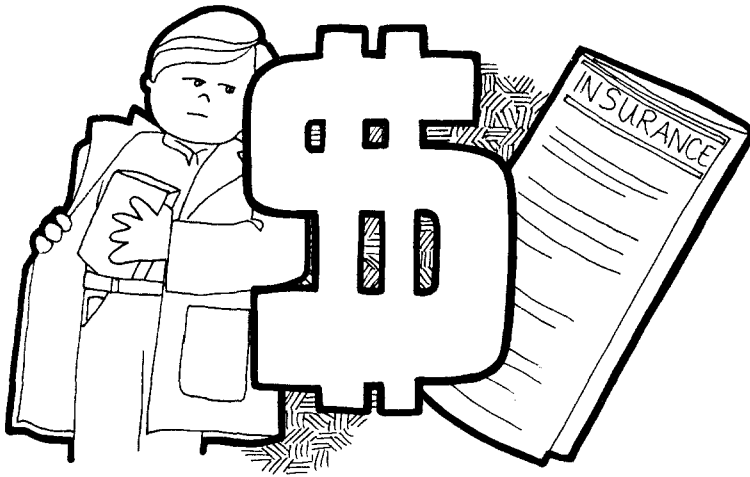
These expenses as well as the cost of space will vary over time with the size and value of inventory. Cost of space includes depreciation or rental expense as well as other operating expenses such as taxes, utilities, maintenance, other interest and insurance expenses not directly attributable to inventory.

If inventory is paid for as it is sold, there is no money tied up in inventory. If average inventory is 30 days of sales and the supplier is paid 30 days after receipt, the supplier's money is financing your inventory. There is no cost of your money tied up in inventory if it is sold within that time. There is also no cost to you when inventory is on consignment. Often, the gross profit on consignment goods may be less.

If inventory is paid for when it is received, the cost of money tied up in inventory is equal to the average annual interest rate on loans (or the equivalent annual rate of return from investing one's money) times the value of your average inventory. By careful management you may

actually make money on inventory, if the inventory is sold in a shorter time period than the time required to pay the supplier. For example, if items are sold in 15 days but the supplier does not require payment for 30 days, one has the use of the money or can invest it in a savings account for the remaining 15 days.

The cost of inventory insurance is usually based on the previous year's premiums (from records) and can be expressed as a percentage of average inventory. This percentage (taking into consideration increased cost with increased inventory value) can be used to project inventory insurance costs for the present or future time periods.



The cost of shoplifting, employee theft and obsolescence and the relationship to inventory levels is difficult to determine. In some cases the amount of theft may not directly relate to inventory size. Improved security could reduce theft even if inventory levels increase. Physical inventory, observation, etc. can identify units lost due to theft. The cost would be equal to the purchase price times the units lost. (Some businesses will prefer to use selling price times the units lost). The annual dollar sales lost from theft divided by the average inventory will determine the cost percentage that can be applied in estimating future losses or determining trends.

Obsolescence for some businesses can be a problem, especially when demand changes quickly. Obsolescence is also a problem in industries in which product changes are evolutionary (a better product is developed than the product you have in inventory) rather than revolutionary (an entirely new product is introduced).

Many businesses have experienced overstock situations in which prices had to be reduced in order to sell them. The dollar value of markdowns represents the cost of obsolescence or in some cases over-buying. Planned markdowns designed to increase sales are not a cost associated with

carrying too much inventory and should not be included. The cost of obsolescence can be determined by dividing the annual cost of markdowns by the average inventory.

Cost of obsolescence =

$$\frac{\text{Annual cost of markdowns on obsolete merchandise}}{\text{Average inventory}}$$

It may be difficult for some businesses to relate this cost to inventory size because controlling inventory and careful ordering practices may be more important than the inventory level. Obsolescence costs should not be included in determining inventory carrying costs if obsolescence doesn't change as the value of inventory changes.

Obsolescence problems usually relate to specific lines or items of merchandise, particularly when discontinued. For some businesses, it may be better to incorporate obsolescence into the inventory carrying cost rate when analyzing an individual line of merchandise rather than the total inventory.

An example of calculating inventory carrying cost follows:

Annual Costs	% of Average Inventory Cost
Interest on investment in inventory	13.0
Handling costs	1.0
Taxes	2.0
Depreciation or rent	2.5
Obsolescence	1.0
Pilferage	3.0
Insurance	1.5
Warehouse costs	1.0
Total Inventory Carrying Costs	25.0%

The relationship of inventory carrying costs to the size of average inventory is depicted in Table 1. The higher the inventory turnover the lower the average investment in inventory required, which results in lower carrying costs.

Table 1. Relationship of Inventory Carrying Costs to the Inventory Turnover Rate for \$100,000 of Sales

Turnover rate	Average investment in inventory	Inventory carrying cost (25% of average inventory)
1	\$100,000	\$25,000
2	50,000	12,500
3	33,333	8,333
4	25,000	6,250
5	20,000	5,000
6	16,667	4,167

This analysis again points out the importance of turning the inventory over while holding down investment in average inventory.

Inventory Control Analysis

Every retail business person should know the business inventory turnover rate, what the inventory level should be and the relationship between gross profit and inventory turnover for their business. Understanding and using these concepts will assist them in knowing how well the business is doing and alerting them to problems or potential problems.

The profit per square foot analysis is also a valuable concept of merchandise control. However, it may be more appropriate and feasible for larger stores. Retailers with computerized inventory records may find this analysis easier than those without computers.

Inventory Turnover Analysis

Knowing your inventory turnover (turn) rate is essential for evaluating the effectiveness of your inventory decisions. This turnover rate refers to the number of times the average inventory has been purchased and sold for a given period, usually one year. Inventory turnover can be calculated in one of the following two ways:

$$(1) \text{ Inventory turnover} = \frac{\text{annual cost of goods sold}}{\text{average inventory at cost}}$$

or

$$(2) \text{ Inventory turnover} = \frac{\text{net sales for the period}}{\text{average inventory at selling price}}$$

Cost of goods sold is equal to the beginning inventory plus net purchases (total purchases less returns and allowances) minus ending inventory. Average inventory is equal to the sum of the monthly inventory values at cost during the year divided by the number of months. Assume the following purchases and inventory levels for a particular business:

Month	Purchases during month
January	\$ 10,000
February	10,000
March	15,000
April	15,000
May	11,000
June	12,000
July	12,000
August	15,000
September	12,000
October	14,000
November	12,000
December	12,000
Total purchases for the year	\$150,000

Month	Inventory at cost
January 1, 1984 (Beg. inventory)	\$ 22,000
February 1	24,000
March 1	27,000
April 1	26,000
May 1	25,500
June 1	25,000
July 1	27,000
August 1	28,500
September 1	27,000
October 1	25,000
November 1	23,500
December 1	21,500
January 1, 1985 (Ending inventory)	23,000
Total	\$325,000

$$\begin{aligned} \text{Annual cost of goods sold} &= \text{Beginning Inventory} + \text{Purchases} - \text{Ending Inventory} \\ &= \$22,000 + \$150,000 - \$23,000 \\ &= \$149,000 \end{aligned}$$

$$\begin{aligned} \text{Average inventory} &= \frac{\text{Sum of inventory value at cost}}{\text{number of months}} \\ &= \frac{\$325,000}{13} \\ &= \$25,000 \end{aligned}$$

$$\begin{aligned} \text{Inventory turnover} &= \frac{\text{Annual cost of goods sold}}{\text{average inventory}} \\ &= \frac{\$149,000}{\$25,000} = 5.96 \end{aligned}$$

An alternative way to determine average inventory is to add the beginning inventory to the ending inventory and divide by two. This method may be adequate for a business that doesn't have much seasonal variation in its operations. However, if there is seasonality to the business as shown in the example above the turnover rate will be somewhat different as depicted below:

Average inventory

$$\begin{aligned}
 &= \frac{\text{Beginning inventory} + \text{ending inventory}}{2} \\
 &= \frac{\$22,000 + \$23,000}{2} \\
 &= \frac{\$45,000}{2} \\
 &= \$22,500
 \end{aligned}$$

$$\begin{aligned}
 \text{Inventory turnover rate} &= \frac{\text{Annual cost of goods sold}}{\text{Average inventory}} \\
 &= \frac{\$149,000}{22,500} \\
 &= 6.62
 \end{aligned}$$

In this case the alternative method will indicate a higher turnover rate than actually exists in a business of a seasonal nature.

The second alternative of calculating the inventory turnover when the inventory and purchases are valued at the selling price will provide similar results. Be consistent in valuing the inventory and purchases either at cost or at selling price when calculating the inventory turnover.

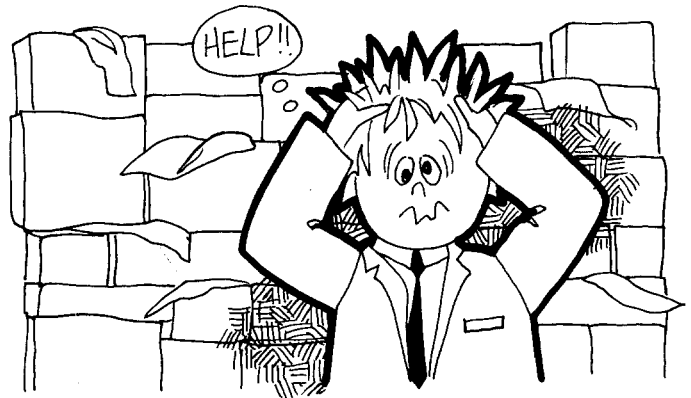
If the industry average for the business is five turns per year (compared to 5.96 turns in the example above), the business is turning over its inventory adequately. However, if the industry average is eight turns per year (compared to 5.96), certain areas of the operation of the business may need to be improved.

The inventory turnover can be increased by increasing sales (and also cost of goods sold) faster than the increase in value of average inventory. Alternatively, average inventory must be reduced at a faster rate than any reduction in sales. Either alternative will work; however, increasing the total sales may be possible only by reducing prices or increasing expenses and profits will suffer as a result. Therefore, in many cases it may be more viable to evaluate your current inventory to determine if it should be reduced.

Excessive inventory levels (and low turnover rates) may result from:

- Not wanting to risk losing a sale to a customer because of a stock-out.
- An unusually large quantity is ordered in anticipation of a price increase.
- A supplier offers a volume discount which you feel you can't afford to pass up.
- Additional brands are added in an effort to expand your customer base.
- Product availability and excellent service are considered to be your greatest assets and therefore you carry huge inventories.
- The high cost of carrying the inventory is not recognized.
- You provide similar inventory as your competitors in order to remain competitive.
- Lack of inventory records and periodic physical inventories.
- Hanging on to outdated inventory with the hope of selling it some day.
- Operating on gut feelings with little or no automatic, built-in warning systems.

Some of these reasons may have some merit for a business but nearly all will lead to higher inventory levels which will hinder your cash flow position and profitability. A business person must decide, based on sound economic reasoning, whether reducing inventory is the approach to take. If it is in a retailer's best interest to maintain higher inventory levels and a low turnover rate, then one should concentrate on maximizing profits under those circumstances.



Low inventory turnover is usually a symptom of an inventory management problem and the retailer must analyze the situation in more detail in order to solve it. The inventory turnover can be calculated for items or groups of items. If the inventory turnover is too low (based on past experience and/or industry averages) and the turnover of low and high volume items or groups of items are nearly equal, then the problem may be with the management of high volume items or groups of items. A further analysis of high volume items may be necessary to isolate problem items. Proper action such as more astute purchasing, determining the appropriate inventory level, and better promotion can be taken to correct the situation.

In a few cases high turnover may be a problem. A high turnover may result from the following situations:

- Stock-out situations resulting in lost sales,
- shortages of working capital requiring a business to carry less inventory, or
- higher cost per unit sold as a result of small order quantities purchased.

One note of caution for businesses on the accrual basis is to be aware of extraordinary purchases at the end of the year which may distort the inventory value and yet not have been available for sale or paid for. Adjustments may have to be made under these circumstances to reflect a more normal inventory value. However, if this is a normal year-end occurrence then adjustments are not necessary.

Average Inventory Supply

The inventory turnover can be used to determine the average inventory to carry. Monthly or daily inventory supplies can be determined. The average monthly inventory is easily calculated in the following manner:

$$\begin{aligned} \text{Average monthly inventory} &= \frac{12 \text{ months (1 year)}}{\text{Inventory turnover rate}} \\ &= \frac{12}{5.96} \\ &= 2.01 \text{ months} \end{aligned}$$

Days sales in inventory can be determined as follows:

$$\begin{aligned} \text{Days sales in inventory} &= \frac{365 \text{ days (1 year)}}{\text{Inventory turnover rate}} \\ &= \frac{365}{5.96} = 61 \text{ days} \end{aligned}$$

This indicates that the business should carry an average of approximately two months inventory (or 61 days) on hand. The average inventory supply is only a general indicator and does not take into consideration the seasonal nature of a business or the difference among types of items.

Determine how many months of inventory are on hand by simply dividing the inventory on hand by the expected monthly sales.

Monthly inventory supply

$$\begin{aligned} &= \frac{\text{Inventory on hand (cost)}}{\text{Expected monthly sales (cost)}} \\ &= \frac{\$36,000}{\$18,000} = 2 \text{ months} \end{aligned}$$

This compares favorably with the average monthly inventory supply calculated using the turnover rate. These comparisons can be made on an item-by-item basis to pin-point excessive inventory assuming there is not much seasonality.

Inventory turnover rates calculated can be compared with industry averages and previous experiences (past years). Industry averages are available from industry trade associations or suppliers, franchisers, and published business statistics such as Robert Morse Associates "Annual Statement Studies" or Dun and Bradstreet ratios. Average inventory supply information is available from trade associations and franchises. Many businesses establish policies for inventory levels based upon expected sales.

If your average inventory supply is higher than industry averages (or turnover rate too low), it provides a general indication that your inventory level may be higher than necessary to support your sales volume. A comparison of your current inventory supply or turnover rate with previous years or months will indicate whether your inventory control is improving or slipping. If a store has a policy of maintaining a four-week supply and inventories reach a five-week supply, then inventories would be cleared or purchases reduced until it was at the four-week level. Conversely, if inventory declined to a two or three-week level, more merchandise would have to be purchased to maintain the four-week level set as company policy. Remember, these are general indicators of how well you are doing.

Gross Profit Analysis

Understanding the relationship of inventory turnover and gross profit will help determine the best strategy to use to reach a desired profit — increase inventory turnover and charge a lower price or vice versa. Gross profit (margin) is defined as the difference between what one pays for the merchandise (cost of goods sold) and the selling price. Gross profit on a particular item is determined in the following way:

$$\text{Selling price} - \text{cost of merchandise} = \text{gross profit}$$

For example, an item costing \$50 is sold for \$100. The gross profit is

$$\begin{array}{r} \$100 \text{ selling price} \\ - 50 \text{ cost} \\ \hline \$ 50 \text{ gross profit} \end{array}$$

and is usually expressed as a percentage of sales or

$$\frac{\$ 50 \text{ gross profit}}{\$100 \text{ selling price}}$$

$$= 50 \text{ percent gross profit percentage}$$

In determining overall gross profit, net sales (total sales less returns and allowances, markdowns, and discounts) should be used in the same formula.

Gross profit is usually expressed as a percentage of sales. Some business people think in terms of cost and may be confused with the mark-up or gross profit percentage. The following chart depicts the relationship of mark-ups based on cost versus sales.

Mark-up Equivalents	
Equivalent percentage of cost	Desired percentage of sales
11.1	10
15.0	13
17.7	15
25.0	20
33.3	25
50.0	33 1/3
53.9	35
66.7	40
100.0	50

A 50 percent mark-up based on cost results in only a 33 1/3 percent mark-up on sales. The retailer must determine if this 33 1/3 percent mark-up is sufficient to cover all operating expenses and provide a desired profit level.

A business person must understand the relationship between turnover rates and gross profit. In a competitive environment business people don't always have the flexibility to raise

prices sufficiently. Consequently, increasing the number of times that the inventory is turned over is one way the profits can be increased. The relationship between turnovers and gross profit (mark-up based on sales) is depicted in Table 2.

A 30 percent mark-up (30 percent gross profit on sales) with a turnover rate of two will yield an annual gross profit of \$600 which is equivalent to a 15 percent mark-up and a turnover rate of four. Many business people should concentrate on increasing inventory turnover rather than raising prices for similar goods in a very competitive market.

In-Depth Profit Per Square Foot Analysis

Profit per square foot indicates how profitable a merchandise item is relative to the selling space the item occupies. Profit per square foot is calculated by dividing the gross profit for an item by the selling space area occupied.

Profit per square foot

$$= \frac{\text{Gross profit by item}}{\text{Square feet of selling space by item}}$$

$$= \frac{\$3000}{300}$$

$$= \$30$$

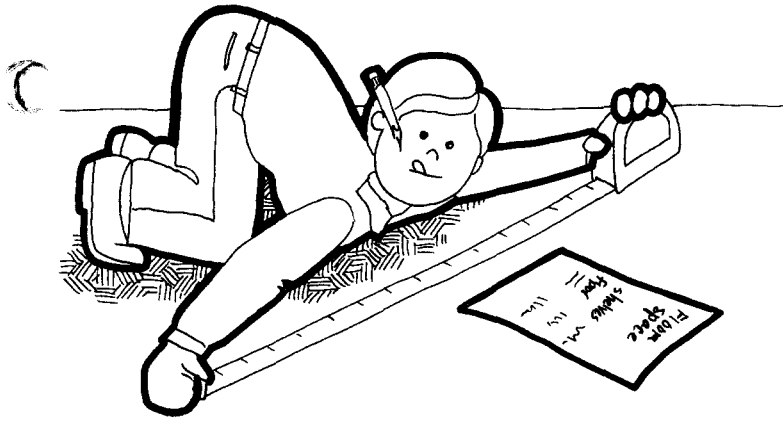
Floor and shelf space in a store are limited. The profit per square foot analysis can be used to determine how much space should be allocated to each item. It can help to maximize profit by making the best use of the space available.

Measure all usable selling space where merchandise is kept—the shelves, the floor space

Table 2. Annual Gross Profit Earned Based on Mark-up and Turnover for \$1000 of Inventory at Retail

(Mark-up)* gross profit %	Turnover Rate											
	1	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	7	8
10	\$100	\$ 200	\$ 250	\$ 300	\$ 350	\$ 400	\$ 450	\$ 500	\$ 550	\$ 600	\$ 700	\$ 800
13	130	260	325	390	455	520	585	650	715	780	910	1,040
15	150	300	375	450	525	600	675	750	825	900	1,050	1,200
20	200	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600
25	250	500	625	750	875	1,000	1,125	1,250	1,375	1,500	1,750	2,000
30	300	600	750	900	1,050	1,200	1,350	1,500	1,650	1,800	2,100	2,400
33 1/3	333	667	833	1,000	1,167	1,333	1,500	1,667	1,833	2,000	2,333	2,667
35	350	700	888	1,050	1,225	1,400	1,575	1,750	1,925	2,100	2,450	2,800
40	400	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,800	3,200
43	430	860	1,075	1,290	1,505	1,720	1,935	2,150	2,365	2,580	3,010	3,440
45	450	900	1,125	1,350	1,575	1,800	2,025	2,250	2,475	2,700	3,150	3,600
50	500	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,500	4,000

*Based on Sales



underneath racks, the floor space where merchandise is displayed, etc. Do not include storage space in the back room. Use only the space on the selling floor.

The profit per square foot should be calculated for the highest and lowest profit lines or items to determine the profitability range. With the use of this range, you can decide on the amount of gross profit wanted from each square foot in the store.

Overall profitability can be increased by taking action on low-profit items. This can be done by:

- Promoting them more effectively,
- reducing selling space allotted to them, or
- replacing them with more profitable items or lines.

If all items, even the low profit items, are providing a sufficiently high profit per square foot, one can increase profitability by:

- Increasing promotion and merchandising efforts,
- expanding the store, or
- both.

Every retail business has to carry some items which customers expect to find in the store, even if they are not very profitable. These low-profit items, some of which may have to be sold at a net loss at certain times, should not be considered in the same manner as regular merchandise in determining the lowest gross profit per square foot that the low-profit items should bring.

Regular merchandise must bring a net profit after all expenses have been paid. To determine what net profit an item or line will bring, calculate the expenses per square foot of selling space and subtract them from the gross profit per square foot to obtain the net profit per square foot for each item or line of merchandise.

Expenses include salaries for employees, rent, insurance, taxes, packing materials, janitorial

services, interest, utilities and other operating expenses as well as a fair salary to you. The sum of these costs divided by the selling area square footage will equal the expenses per square foot. In the following example total expenses are \$50,000 and there are 5,000 square feet of selling space. The expenses per square foot are: $\frac{\$50,000}{5,000} = \10

Any item that is providing an annual gross profit per square foot of less than \$10 is not bringing any net profit. The item or line is not paying its way and should either be promoted more effectively or be considered for replacement by more profitable items.

Inventory Level Control

There is a tendency for businesses to try to be all things to all people. Some business people maintain that low-volume and low-profit items must be stocked and sold to customers in order to receive their high-volume and high-profit business. This rationale has merit in maximizing sales but may not help much in maximizing profit. The extent to which profitable items should cover the less profitable items is not an easy decision. It requires sound business judgement.

80/20 Rule

Although there are no easy answers, a method of analysis called the 80/20 rule can help you establish priorities as to how much effort and how much of your resources you should devote to various inventory items or lines. The principle behind this rule is that you should analyze your business operations to give the highest priorities to matters of greatest importance and less time and resources to matters of less significance. Classifying or dividing up inventory into groups or categories will be helpful.

A retailer should determine what percent of the merchandise or products make up 80 percent of the unit sales volume. The average for most retail businesses is approximately 20 percent. When analyzing sales volume of items, the remaining 80 percent of the stock items will represent 20 percent of the sales volume. Similarly, in a typical inventory, you may determine that 20 percent of the items represent 80 percent of the total value of inventory. Conversely, 80 percent are low cost inventory items that represent 20 percent of the inventory dollar valuation. The amount of time and resources devoted to the high sales volume and inventory value should correspond to approximately the same percentage as depicted by this 80/20 rule.

This analysis can be used as a “rule of thumb” in evaluating your business assuming the average business under this 80/20 rule is profitable and well managed. For example, if only 10 percent of the items you stock constitute 80 percent of your sales, too many items are being stocked. Conversely, if 80 percent of your sales are derived from 45 percent of the items, too few items are being stocked. Lead-times, safety stock requirements, service level considerations, etc., must also be considered in evaluating inventory stocking decisions.

The inventory of every business will not fit perfectly into this 80/20 rule. However, the concept of concentrating your efforts on the high volume and high value items is important to improving profitability of every business.

ABC Analysis

The principles of the 80/20 rule are incorporated into what’s called ABC analysis. ABC analysis calls for all inventory items to be divided into three categories based on the dollars spent annually for each item. A typical example of classifying inventory might include the following:

- The “A” category would contain 15 to 20 percent of the inventory items but represent 70 to 80 percent of the cost of inventory purchases.
- The “B” category could include 30 to 35 percent of the items that represent 10 to 15 percent of the cost of inventory.

- The “C” category would include the remaining 50 percent of the items that represent only 10 to 15 percent of the cost of inventory. The actual percentage for each category will vary by type of business.

Inventory items have different costs, sizes, annual usage, obsolescence and regularity of use. As a result the inventory controls employed will vary to fit particular situations. The following ABC classification depicted in Table 3. breaks inventory stock into the three ABC categories: (A) Stock which requires close control, (B) stock which requires moderate control and (C) stock which needs minimum control.

Class “A” items require close control because the items represent a large proportion of the inventory value. Accurate forecasts of future usage based on detailed records are required. If inventory levels for class “A” items can be reduced, inventory investment can be significantly reduced.

Class “B” items need moderate control. These items are typically reordered based on past usage rather than forecasts.

Class “C” items could be time wasters if too much time is spent in planning and controlling.

The ABC classification is demonstrated in Table 4.

Table 3. Inventory Classification and Control

Criteria Classified	Normal inventory criteria by classification		
	A	B	C
Cost per unit	High	Average	Low
Lead time	Long and/or irregular	Short and/or stable	Short and stable
Annual amount used	High	Average	Low
Usage pattern	Erratic unpredictable or seasonal	Seasonal or regular	Constant and/or predictable
Size, weight, sturdiness	Bulky, heavy and/or delicate	Average	Small, light, sturdy
Obsolescence or spoilage	Very likely	Unlikely	Rare
Records	Detailed	Detailed	Less detailed
Safety stock	Low	Moderate	Large
Inventory Control System	Frequent Review Requires tight control and frequent reviews. Order quantity depends on estimated requirements.	Perpetual Automatic system. Card inventory, and use of a reorder point and fixed order quantity based on past usage.	Bin Simplest automatic control kept by looking at inventory levels. Also requires a reorder point and fixed order quantity when supply gets low.

Table 4. ABC Usage Computation and Classification

Items	Units Used or sold		Unit Cost	Total Cost	% of Total	Classification
	Number	%				
#12	500	1.7	\$30	\$15,000	19.4	A
#24	1,000	3.3	20	20,000	25.8	A
#33	2,000	6.7	4	8,000	10.3	B
#44	2,500	8.3	4	10,000	12.9	B
#55	3,000	10.0	3	9,000	11.6	B
#66	5,000	16.7	1	5,000	6.4	C
#77	5,000	16.7	1	5,000	6.4	C
#88	5,500	18.3	.50	2,750	3.6	C
#99	5,500	18.3	.50	2,750	3.6	C
Total	30,000	100%		\$77,500	100%	

Certain special items do not conveniently fit the ABC system. These items may appear to fit into the "C" category but may need special attention as if they were "A" items. There are usually only a few items that would require this treatment. Some of the factors that may require a "B" or "C" item to be treated as an "A" item include:

- High chance of theft, obsolescence or deterioration
- Irregular lead time
- Fluctuating changes in demand
- Improper storage for large bulky items
- Stock-out would involve a sizeable loss.

Inventory Control Systems

Either the perpetual or the two-bin inventory control system will be appropriate for the inventories of most small businesses. The objective of an inventory control system should be to provide good service to the customer and adequate control information to the business person at the least cost.

Perpetual Inventory System

A perpetual inventory system is used by businesses that sell a limited variety of items or lines of merchandise that have high per unit value. This system requires a detailed and current record of inventory items.

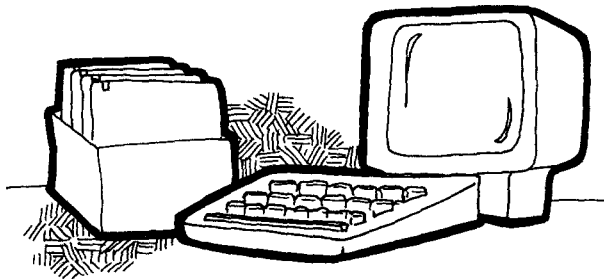
Inventory control cards are used to record purchases received, units sold and the balance on hand for each inventory item. Perpetual inventory cards not only tell the amount of inventory on hand at any time, but also aid in controlling the total investment in inventory. Each card can list maximum and minimum quantities of the item that should be kept in stock. Over supplies or under supplies can be avoided by keeping the stock of each item within the maximum and minimum limits. A physical count (inventory) of each item in stock should be made to check the accuracy of the inventory records at least once a year. A physical inventory should be taken more often (monthly, quarterly or semiannually) for some businesses or items. A typical inventory control card may resemble the following:

Inventory Control Card

Item _____				Maximum _____					
Location _____				Minimum _____					
Date	Received			Sold			Balance on Hand		
	Units	Cost	Total	Units	Cost	Total	Units	Cost	Total

The number of each item in inventory is known at all times. The stock status for each item is shown at the end of each day or each time a transaction (purchase or sale) occurs. This allows for the maintenance of a relatively low safety stock. The cost of maintaining a perpetual inventory system is higher due to more records as well as more clerical and managerial attention. It is more efficient to use a perpetual inventory system for "A" and for some "B" items, but it is usually too costly for "C" items.

Small businesses with the aid of computers may be able to use the perpetual inventory system for all items. Once the perpetual inventory system is set up, the computer can be used to maintain the detailed and current records potentially more efficiently while providing more information than with a manual system. Many businesses have the cash register tied into the computer allowing for current inventory balances by item as each sale is made.



Micro-computers are not always practical or economically feasible for some small businesses. However, as software and technology is developed and becomes more affordable, more businesses may be able to use a computer for detailed inventory records. Some businesses may still use a combination of the perpetual and the two-bin systems.

Two-bin System

The two-bin inventory control system requires that each item be separated into two bags, bundles, or bins. One bin contains enough stock to satisfy usage requirements which occur between receipt of the goods and the time for placing a new order. Units are sold from the first bin until depleted and a new order has to be placed. The second bin contains an amount to cover safety stock plus estimated usage during the time when the new order is placed and when the goods ordered are actually received. This second bin (reorder point stock) is kept physically separate from the stock in the first bin. When the first bin runs out the second bin is used and this signals that the new order has to be placed.

"B" items require use of either the perpetual or two-bin system or a combination of both. "C"

items generally require the less sophisticated two-bin system.

Inventory Stock Level

Earlier in this publication, average inventory supply was calculated using the inventory turnover rate. This is used as a general guideline. Other factors need to be considered in determining the desired inventory stock level. These factors include: product shelf life, quantity discounts, freight charges, unexpected shipping delays, strikes, manufacturing problems and unforeseen weather conditions.

Inventory levels should be based on lead time, safety stock and basic stock. **Lead time** is the length of time between order placement and receipt of goods. It will vary from daily delivery of items such as bakery goods to a few weeks for various nonperishable items.

Merchandise stocked as protection against delivery delays, unexpectedly large orders, strikes, etc., is called **safety or cushion stock**. The amount of the safety stock will depend upon the potential for and number of factors that could interrupt deliveries. It would have to be based on your experience with suppliers in the industry. A business receiving frequent delivery of merchandise will require lower safety stock.

High valued "A" items will require safety stock. More control of these inventory items should lessen the likelihood of stock-outs. Low valued "C" items require higher safety stock levels because the primary inventory goal is don't run out while spending less time monitoring these items. The low valued items relative to total inventory means that a higher inventory level will have little impact on total inventory investment. Many items require a **basic stock** which is an amount sufficient to cover regular sales and offer customers a reasonable assortment of merchandise selections.

A "never-out" list should be prepared as a checklist for staple merchandise which is in demand all year with very little change in model or style. This "never-out" list should be analyzed at regular intervals, such as every two weeks, to avoid stock-outs. Determine the expected sales for the normal buying and delivery period plus safety stock as the desired level to keep on hand. Subtract from this desired level the number of units on hand to determine how many should be ordered.

These concepts can be incorporated into what's known as an **open-to-buy** system. The open-to-buy

is a measure of how much merchandise at cost or retail to introduce into stock during a control period, such as one month, in order to "land" your stock at a predetermined level at the end of the period. It is calculated as follows:

Open to buy =

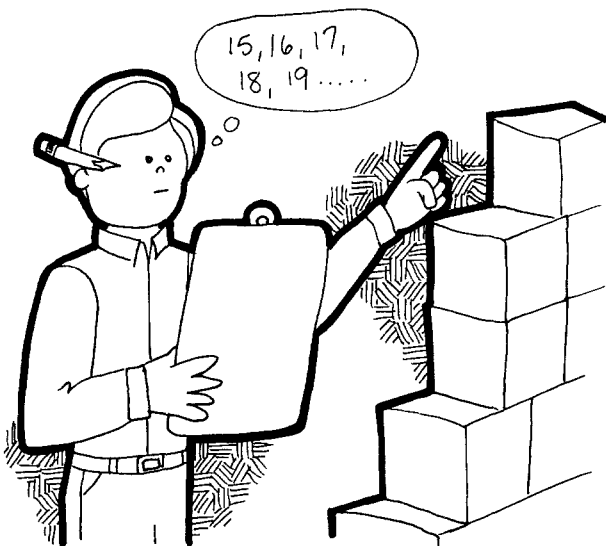
$$\text{Planned Sales} + \text{Planned Ending Inventory} - \left[\text{Current Inventory above safety stock} + \text{Merchandise on order} \right]$$

This provides a fairly specific indication of the quantity of merchandise you can practically buy. The final quantity bought should be adjusted according to each type of merchandise on the basis of seasonality, discounts available, credit terms, and item profitability.

Physical Inventory

A physical inventory should be taken periodically to determine any discrepancies or losses. The actual quantity of each item must be counted and compared with that shown on the inventory records. Necessary adjustments should be made immediately.

Unexpected stock-out situations will signal the need to determine the cause of the discrepancy. In some cases a partial physical inventory of certain merchandise lines may be necessary to identify the extent of the problem as well as future solutions.



Some key factors in taking a physical inventory include the following:

- Choose a cut-off date.
- Set aside time to train and organize employees.
- Make sure all inventory items are accounted for.
- Develop a list of all items prior to the actual physical count to save time.
- Pre-price the inventory list for ease in extending the totals.
- Double check arithmetic.
- Clean up display and storage areas.

Differences between book and physical inventory arise for a variety of reasons. Pilferage is one of the most common sources of loss. Any business should monitor and control inventory to detect problems as soon as possible.

Poor receiving procedures can also be a problem. Some receiving clerks may not be counting actual quantities received and comparing them to the vendor's packing list or invoice. If the quantity received is less than the amount invoiced and goes unnoticed, your business has to absorb the loss.

In some cases, merchandise may be sold to customers without being billed due to oversight or carelessness. Some business people fail to return merchandise to the vendor when it is returned by the customer in a condition unfit for resale. Careful hiring and training of trustworthy employees will go a long way in minimizing these losses.

Sales Forecasting

Techniques of forecasting sales will vary by the type of merchandise. Most businesses carry a combination of staples, seasonal goods, and perishable or stylish merchandise. The goal of sales forecasting and purchasing should be to maintain inventory at the lowest and safest level and provide sufficient variety of colors, sizes, models, etc., for the customers. This will help reduce carrying cost losses due to obsolescence and spoilage.

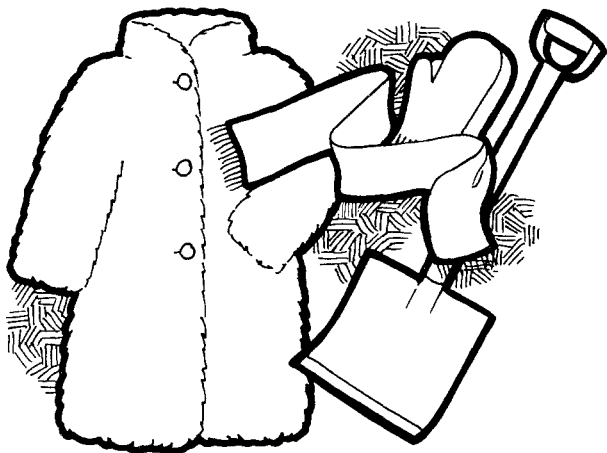
Staple merchandise which seldom changes in style or model is usually in demand throughout the year. Basic appliances, hardware, housewares, books, domestics and basic clothing items such as undergarments, socks and pajamas are normally considered staple items. These products help to bring customers into the store to purchase primary merchandise as well as increase profits. Steady

usage which enables a business to purchase as needed is the primary characteristic of staple items.

Profitability, sales trends and discounts offered are the deciding factors in determining how much to buy. Naturally, merchandise which is more profitable to carry and which can be obtained at the best cost (including discounts) are the items that are the most desirable to purchase. Sales records from previous months, seasons, or years which indicate the quantity of each staple item sold will provide an indication of what current sales will be. If the trend is up from previous periods, you can determine if it's necessary to increase the inventory level of those items or to maintain them at current levels and still avoid stock-outs.

Seasonal merchandise as the name implies will be in demand during certain times of the year. Many seasonal items correspond to the weather or climatic seasons and include items such as winter or summer sporting equipment, yard equipment, automotive accessories, clothing, etc. Predicting seasonal sales will usually depend on past experience with the merchandise, previous sales records, selling price, length of season, competition, advertising and promotion, and trade journal or industry predictions. Seasonal merchandise is usually purchased in advance of the peak demand period to avoid slow delivery or unavailable items.

Seasonal merchandise sells fast in season but moves slow or stops during the off season. It is critical to satisfy seasonal demand with little or no merchandise left during the off season. A business person must rely heavily on what the customer demand for that item or merchandise line was in the past. Maintaining a monthly tally of units sold or dollar value of units sold can help you determine seasonal trends to assist with current buying. The use of a sales record sheet or card as shown may help to determine seasonality of merchandise items.



Seasonal Sales Record for Item

Months	Units Sold by Year		
	1984	1985	1986
January	50	55	
February	40	40	
March	0	0	
April	0	0	
May	0	0	
June	0	0	
July	0	0	
August	0	0	
September	50	60	
October	60	65	
November	100	110	
December	150	145	
Total Units Sold	450	475	
Total Purchased	450	475	
Units Sold Below Cost	30	25	

In addition to maintaining seasonal sales records, suppliers and their salespeople can serve as a good source of information for predicting sales. Predictions should include pre-season sales, if planned, to entice customers to buy from you instead of your competitors. End-of-season sales should be included in the forecast only if profitable to do so. If late season sales are not profitable, more careful estimates must be used to avoid excess or dead inventory that must be sold at little or no profit.

Style items and perishable items have a demand that increases rapidly and drops off nearly as fast. Stylish merchandise such as men's and women's apparel, furs, etc., are usually more expensive than staple or seasonal merchandise. Overbuying can be disastrous to profits because of the cost of the merchandise and the difficulty in selling at a profit once the style is out. Perishable merchandise such as fruits and vegetables are somewhat similar due to the potential for spoilage. Although not as expensive as stylish goods, perishable goods may only be sold for a fraction of the normal price once they start to spoil.

Suppliers

Suppliers can be an excellent source of assistance in determining inventory levels, predicting sales, and offering merchandising suggestions as well as offering purchase

discounts. Most suppliers are reliable and can offer assistance. In some cases you may need to replace undesirable suppliers or find suppliers for new merchandise you plan to stock. Information on suppliers can be obtained from supplier sales people, trade magazines, yellow pages, business contacts, trade shows and trade directories.

Factors to consider in choosing the best supplier include:

- price and discounts
- quality
- reliability
- accessibility

Price is the primary consideration in the selection of a supplier assuming the quality and service are equal with other vendors. Various aspects of purchasing affect price, including quantity, discounts, special allowances, opportunities to purchase special lots, sell-outs or seconds, and the dating of invoices.

Quality is almost as important as price. Assurance that quality will remain constant and that poor quality shipments will not occur is an important attribute of any supplier. If a problem occurs, good suppliers will stand behind their products and services and will remedy the situation as soon as possible.

Reliability of delivery is important to avoid sales losses as a result of stock-outs. Slow or unreliable inventory delivery will force you to maintain higher inventory levels and thereby increase carrying costs. Good suppliers will be there to assist you when in need of some quick supplies or for sudden emergencies and will keep you informed and protect you from potential industry shortages due to strikes or other disasters.

Services provided by suppliers include: spaced deliveries, allowing larger quantity purchases than immediately needed (split shipments) to obtain quantity discounts, co-op advertising, promotional displays and materials to promote the merchandise, literature, bags, and other give-aways for the customer.

Accessibility is important in order that special problems can be discussed with the supplier. A supplier that is difficult to contact may not be as desirable as one who can be easily reached.

Quantity Discounts

Suppliers frequently offer discounts for larger volume purchases. This may require carrying

higher inventory levels than planned. Some suppliers also may offer split shipments in which you can ask for delivery when needed and still take advantage of the discount. If split shipments cannot be obtained, it must be determined whether the discount is equal to or exceeds the higher inventory carrying costs.

Earlier in this publication inventory carrying costs were discussed. Interest on money invested, additional insurance, cost of space and sometimes obsolescence or spoilage can easily add up to 20-25 percent (or even higher) of the average merchandise inventory per year.

The inventory carrying cost should be compared to the equivalent savings from the discount offered. Cash or early payment discounts can also be converted to an equivalent annual interest rate as shown in Table 5.

Table 5. Equivalent Annual Interest Rates of Discounts*

Discount Terms	Days Net Due			
	30	45	60	90
	----Equivalent Annual Interest Rate----			
0.5%, 10th, net **	9.1% ^a	5.2%	3.7%	2.3%
1.0%, 10th, net **	18.3	10.4	7.3	4.6
1.5%, 10th, net **	27.4	15.6	11.0	6.8
2.0%, 10th, net **	36.5	20.9	14.6	9.1
0.5%, 30th, net **	—	12.2	6.1	3.0
1.0%, 30th, net **	—	24.3	12.2	6.1
1.5%, 30th, net **	—	36.5	18.3	9.1
2.0%, 30th, net **	—	48.7	24.3	12.2

*The equivalent annual interest rate can be calculated using the following formula:

^aEquivalent Annual Interest Rate =

$$\frac{(\text{Cash Discount Rate}) \times (365 \text{ Days})}{(\text{Account Due Period}) - (\text{Cash Discount Period})}$$

$$= \frac{(0.5) (365)}{(30 \text{ days}) - (10 \text{ days})} = 9.1\%$$

**The account due period (days net due) in this table is represented by the range of time of 30, 45, 60 or 90 (as depicted by the columns across the table) days depending on the policy of the business.

The cash discount rate, the length of the cash discount period, and the length of the account due period affect the equivalent annual interest rate. For example, a 2 percent discount if cash is paid in 10 days, with an account due date of 30 days (2%/10, net/30 days) results in an equivalent annual interest rate of approximately 36.5 percent $[(.02 \times 365) \div (30 - 10)]$. The inventory carrying costs of a business must be less than the equivalent

annual interest rate to make the discounted purchase economically feasible. If the discount rate is decreased to 1 percent, you would be giving up a potential savings of 18.3 percent annually $[(.01 \times 365) + (30-10)]$.

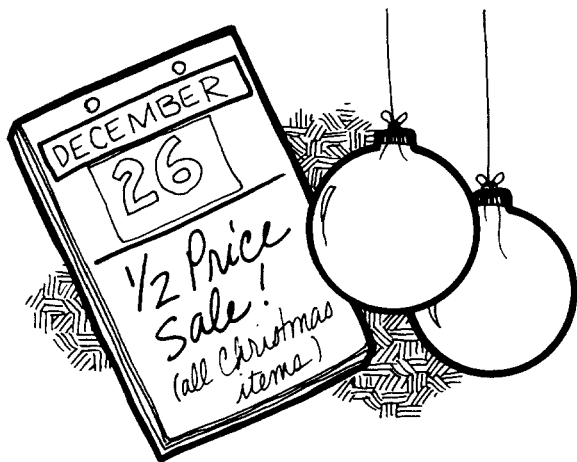
If the total credit period is increased from 30 days to 45 days, the equivalent annual interest rate would decrease to 20.9 percent $[(.02 \times 365) - (45 - 10)]$. Therefore, negotiating to increase the cash discount rate or the supplier decreasing the account due date should increase the attractiveness of the cash discount.

It is usually to your advantage to accept the cash discount if: there is no cash flow problem; the discount is greater than the inventory carrying costs or the return the funds would otherwise earn; or funds can be borrowed from other sources for less than the discount amount. In addition to this cost analysis, retailers must also base the purchase decision on the current inventory level, turnover of the merchandise, and whether it can be sold during the season.

Merchandise Replacement

Products that are not very profitable should be closely scrutinized to determine if merchandising can be improved. Markdowns, special sales, and advertising are often used to increase sales of slow-moving merchandise. If it is obvious that these promotions will not improve sales, gradual replacement of certain lines or items may be the best strategy.

Selling slow-moving merchandise at a lower mark-up or even at less than cost is one of the hardest strategies for retailers to accept. Every business, particularly stylish-type firms, have this problem. Merchants with excess Christmas ornaments usually sell them for half-price the day



after Christmas to avoid having capital tied up for nearly a whole year. Most merchants will sell this merchandise for what they can get for it by having special sales, using markdowns and advertising.

It is generally better to locate replacement merchandise before phasing out undesirable goods to avoid gaps and narrowing the selection offered. This is especially true when an entire merchandise line is being dropped because it would create lower overall sales volume to cover fixed costs.

Ideas on replacement merchandise can be obtained from:

- Customer requests for products not carried
- Observe competitors operating similar stores
- Obtain suggestions from salespeople and suppliers
- Follow advertisements in chain stores and department stores
- Study trade journals and literature

Once a new product or line has been introduced in your store, it must be supported with in-store promotions, advertising and sales efforts. A promotion is sometimes defined as letting the customer know that something has changed. They must be made aware that you have added a new line or product before it can become profitable. Only after all sales and promotional efforts fail, should these products be marked down, the remaining items sold and start again with a different item. Through perseverance, this gradual and sometimes difficult process can help identify the least desirable items, slowly replace them, and gradually improve the profitability of the store.

The following checklist was designed by the Small Business Administration to be used for improving the merchandise mix in your store. It can be used as a starting point and in combination with other ideas and experiences for improving merchandising in your store.

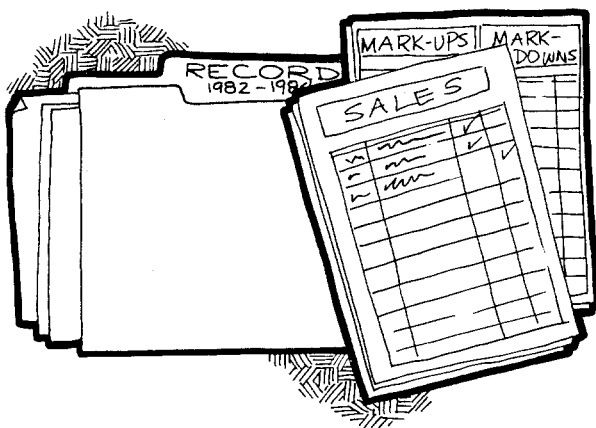
- Classify your merchandise into categories based on size and cost.
- Determine which products appear to be the best and least desirable products in each category.
- Set reasonable stockturns for each category.
- Work gradually toward an inventory position which will bring equal turns on all merchandise items and lines within each category.
- Determine what profit per square foot the poorest items of each category bring.
- Determine which of your least desirable items might be made more attractive through in-store promotion and which items are less promising and need to be replaced or eliminated.
- Hold sales on all the items which should be eliminated.

- Advertise and promote those items that appear to have some promise in becoming more profitable.
- Experiment with new products which may be able to replace your least desirable merchandise.
- Evaluate the results of advertising and promotion to see whether the additional products should be replaced.
- Find new products to take their place.
- Try advertising and promoting those new products to see whether they are any better.
- Strive to gradually develop an improved line of merchandise.

Inventory Control Recommendations

The inventory control practices used by a business person will depend on the type and size of business as well as the type and value of the merchandise. The following inventory control recommendations will be applicable for most retail stores:

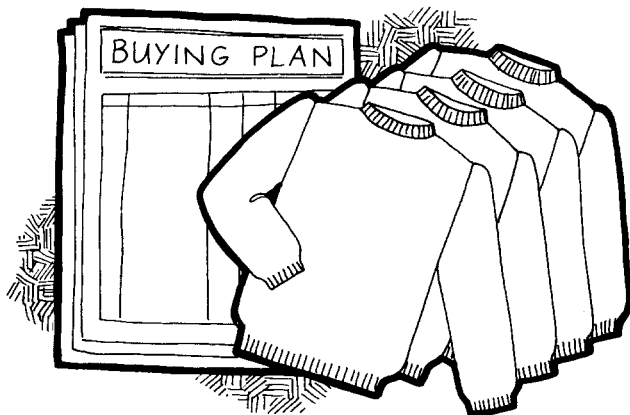
- **Organize your store into selling departments by merchandise types.** This will facilitate merchandising and enable a person to determine the profitability of groups of merchandise and the ability of salespeople.
- **Keep accurate and up to date records of sales, inventory, mark-ups, mark-downs, and purchases by merchandise type.** Analysis of dollar sales, inventories, purchases, mark-ups and mark-downs of merchandise is crucial in determining an overall adequate markup.



Sales and purchases by type of merchandise can be reported in a timely manner, or sales can be derived periodically by subtracting the current physical retail inventory for each type of merchandise from the sum of previous physical inventory and purchases at retail.

- **Prepare a “never-out” list for staple and reorder items and check it frequently against the actual assortment on hand.** Avoid being out of staple items. For each item determine the unit requirements by estimating sales during the scheduled sales period plus the normal delivery time and include some as safety stock. Subtract the number of pieces on hand and on order, if any, and the difference will represent the proper reorder quantity.
- **Determine if your inventory is being turned over as many times as necessary to succeed in your industry.** Calculate your inventory turnover and compare it to the average for your industry, past years experience, or both.
- **Make certain that the best-sellers are reordered promptly and in sufficient volume and that the slow-sellers are processed swiftly for clearance.** Be sure that a quick reorder can be promptly obtained when a new novelty or style number is sampled. Some merchants lose a great deal of potential business because they do not reorder promptly before the initial supply is sold out or the delivery period is very long.
- **Use a reliable system for determining and controlling slow-selling stock.** This could include a periodic check of all items or it might be based on a perpetual inventory record which would reveal the items not moving. Control records should show the date the merchandise was received. When inventory is taken note the value of goods in each age bracket—less than three months old, three months to six months old, six months to one year old, and more than one year old.
- **Use a unit control system for fashion lines that shows the best-sellers and slow-sellers.** The control system may be a daily or weekly analysis of sales in units, by style number, size and color, or it may involve keeping a record of the transfer of goods from reserve to forward (display) stock.
- **Develop a model stock plan by merchandise type for key points of time in the season to maintain a balance between breadth and depth of the assortments.** Records can be used to develop a unit plan to show the number of different varieties (units) to carry in stock and the number of each variety to avoid running out. A model stock should be broken down by customer preference factors such as price lines, types, materials, colors and sizes. If you do not keep control records by inventory item, visually inspect the stock frequently to determine excesses and shortages.
- **Use a written buying plan to guide your selection when ordering seasonal merchandise.** A buying plan—the outgrowth of a sales and model stock plan—is based on such factors as price line, type, and material.

It includes a scale to help determine the selection of sizes and colors. It normally does not include specific style numbers, which are determined at the time and point of purchase. The buying plan may include the number of different styles to carry and the number of colors and sizes.



- **Control purchases in dollars by an open-to-buy system.** This will provide an indication of how much to order when negotiating the purchase with the suppliers. It can help prevent over-buying as a result of special deals from suppliers looking to unload overstocks or out-dated merchandise. The amount purchased will also depend on discounts, terms of the sale, price, type of merchandise, etc.
- **Determine the amount of merchandise shortages at least twice a year.** A physical inventory should be taken at least twice a year and compared with your "book" inventory to determine the amount of stock shortage. Consult your accountant on how to determine the amount of "book" inventory.
- **Take adequate safeguards to reduce shoplifting and pilferage in your store.** Develop a sense of loyalty and responsibility in your employees that will keep them alert to any evidence of theft. Instruct employees on how to handle people suspected of shoplifting. Arrange the layout of your store so that the actions of customers can be readily observed. Cooperate with other merchants and the police in apprehending shoplifters. Hiring an outside protection service to watch selling areas may be feasible for some businesses.
- **Obtain ideas on merchandise selection by studying other stores in and out of the area and from suggestions from salespeople in similar stores.** Watch closely the merchandise other stores do and do not offer and determine whether merchandise not offered may have potential. Other ideas may be obtained by listening and speaking with customers in general about what impresses

them about other stores. Small retailers can also read trade literature and follow advertisements of chains and department stores.

- **Concentrate on avoiding or preventing understocking of fundamental lines and overstocking of fringe (secondary) items.** Knowing your customers and their needs is crucial in merchandise selection. Look on yourself as a buying agent for the consumer more than as a selling agent for the supplier.
- **Keep separate, in records and in stock, goods which do not belong to the store such as the customer's own goods and goods on consignment.** Legally, you are a consignee for the goods of others and have a special responsibility.

Summary

Efficiently managing inventory is crucial for any business and takes on even greater importance in areas of rural population decline. The success of any retail business depends on the ability to provide the customer with the right merchandise in the right place at the right time and in the most cost-effective way possible.

Many of the techniques described for analyzing and monitoring inventory are general guidelines that may be adapted to each unique business or industry. Inventory problems for retailers will vary considerably by type of business. These techniques should be used along with experience and professional judgement unique to the business being operated. There is no substitute for constantly monitoring inventory in the most cost-effective way possible.

It may be advisable to seek competent assistance from people who have experience in the same type of business you are operating. Information by type of business can be obtained from various trade associations, franchisers, and/or suppliers; agencies such as the Small Business Administration, and published business reports such as those from Robert Morse Associates, Dun and Bradstreet and National Cash Register.

Acknowledgement

Special recognition is given to Mike Gallagher of the SBA in Fargo and Dr. Howard P. Lysne, Accounting Professor, Moorhead State University for their helpful suggestions, information and assistance.

References:

Steinhoff, Dan, **Small Business Management Fundamentals**, McGraw-Hill Book Company, 1978

The information contained in this bulletin was adapted in part from the following:

U.S. Small Business Administration, "Business Basics - Retail Buying Function," No. 1010.

U.S. Small Business Administration, "Business Basics - Inventory Management - Wholesale/Retail," No. 1011.

U.S. Small Business Administration, "Business Basics - Retail Merchandising Management," No. 1012.

U.S. Small Business Administration, "Inventory Management: Are Your Profits Sitting on a Shelf," Small Business Management Training Instructors Guide, No. 113.

Cooperative Extension Service, North Dakota State University of Agriculture and Applied Science, and U. S. Department of Agriculture cooperating. Myron D. Johnsrud, Director, Fargo, North Dakota. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. We offer our programs and facilities to all persons regardless of race, color, sex, religion, age, national origin, or handicap; and are an equal opportunity employer.