

THE UNIVERSITY OF MINNESOTA

GRADUATE SCHOOL

Report

of

Committee on Examination

This is to certify that we the undersigned, as a committee of the Graduate School, have given Rudolph Harry Anderson final oral examination for the degree of

Master of Arts

We recommend that the degree of

Master of Arts

be conferred upon the candidate.

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THE UNIVERSITY OF MINNESOTA

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Report
of
Committee on Thesis

The undersigned, acting as a Committee of the Graduate School, have read the accompanying thesis submitted by Rudolph Harry Anderson for the degree of Master of Arts.

They approve it as a thesis meeting the requirements of the Graduate School of the University of Minnesota, and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts.

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PERPETUAL INVENTORIES

A THESIS SUBMITTED TO THE FACULTY OF THE
GRADUATE SCHOOL OF THE
UNIVERSITY OF MINNESOTA

BY

RUDOLPH H. ANDERSON

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

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MASTER OF ARTS

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CHAPTER I

INTRODUCTORY

CHAPTER I

INTRODUCTORY

Economic theory teaches that in general the price of a commodity tends to equal its cost to the marginal producer.¹ If the demand for the commodity decreases, infra-marginal producers will reduce their prices to stimulate the demand so that the entire supply may be taken off the market. The producer at the margin who has been selling the commodity in the competitive market at just about what it costs him to make it, is now forced out of the industry. He will lose money on each unit which he manufactures, if he continues. When such a condition arises, the sooner the producer in question becomes aware of it and directs his energies into other fields, the better for him and the better for society as a whole. The same line of reasoning may be applied to the capitalist or the landowner whose factors are devoted to the production of a commodity under similar conditions.

In an ideal industrial society, every particle of labor, capital, land, and managerial ability would always be devoted to what for it was the most profitable occupation. But in actual industrial society, no such desirable co-ordination of the productive elements exists. Each quantity of each factor is experimented with here and there in a bungling fashion, and frequently by chance or by the sagacity of its

1. This is the more widely accepted view, that set forth by Marshall and Taussig. It has been ably criticised by a number of prominent economists, among them Davenport and Hobson.

director, finds its way into the most favorable occupation or industry.¹

It often happens that a business man accustomed to a fair return on his investment, finds at the end of the year that he has not made the profit he expected. Conditions have gradually changed, he has probably sustained a slight loss. At the end of the next year, after determining the year's loss, he decides to go into some other line of endeavor. The energies and capital of this man have been misdirected and, to a certain extent, wasted during a long period. If he could have had an accurate knowledge of the results being obtained by his business from day to day and from month to month, he would have re-arranged his factors of production so as to secure more favorable results. Perhaps he would have used more capital and less skilled labor, or vice versa. Or he would have shifted the factors under his control into some other industry, or applied them to some other branch of the same industry, or concentrated them on the more successful portions of his business. The mobility of the various factors affects the speed of readjustment, but the difficulty in such cases as these - and they are numerous - is the lack of accurate knowledge as to actual conditions except at periods which are much too far apart.

A case in point, is that of a manufacturing concern which kept its factory running at full capacity during the period of business depression in 1921. The directors studied the monthly trial balance and other statistical data prepared from the company records through-

1. Marshall in Book V, Chapter VIII, of his "Principles of Economics" (1910 Edition, p.404) remarks on this point, "So far as the knowledge and business enterprise of the producers reach, they will in each case choose those factors of production which are best for their purpose." Whenever it appears to the producers that they are not getting the best results at the lowest cost, "they will, as a rule set to work to substitute the less expensive method."

out the year, and at each directors' meeting the consensus of opinion was that the company was at least "breaking even" and that operations should be carried on as usual in order that a firm foothold might be gained in the selling field for the next year's business. At the end of the fiscal year an audit of the company's books showed that the concern had sustained a loss of nearly \$40,000.00 on gross sales of approximately \$200,000.00. Accurate monthly operating statements showing losses or gains would have called to the attention of these directors, early in the year, the growing loss and would have impressed upon them that, for their particular business, conditions were temporarily so unfavorable that operations should be suspended or much curtailed. If this had been done, two-thirds of the loss would have been avoided. The labor and a considerable portion of the capital employed in this business would have been utilized to much better advantage in other fields.

In order that society and the individual may secure a maximum satisfaction of wants, it is necessary that the entrepreneur, the capitalist and the land owner be at all times aware of the return which they are receiving from their investments. They must be sensitive to every change in the conditions affecting their business interests.

One of the very greatest obstacles to constant knowledge and speedy adjustment in the past has been the absence of accurate inventory information. Profits and losses cannot be determined in merchandising concerns or in factories without knowing what the goods on hand are worth at the moment, for without such knowledge the cost of the sales made cannot be determined. To make a physical count and valuation of merchandise or material on hand in an average concern takes from one

to two weeks and is usually done but once a year. All other factors affecting profits can be arrived at with comparative ease at any time. The records of any company show income and expenses, purchases and sales; but they do not show inventories, and without inventories the cost of the sales made during the period cannot be ascertained. In the past an operating statement was accordingly made out only at the time of the physical inventory, and at that time only could it be determined what results had been attained during a year's operations. Of course, an experienced man could tell in a general way how things were going, but he had no accurate information to rely on, and the best he could do was to guess. However, the preparation of daily or monthly operating statements has been made possible, and the determination of the financial condition of a concern at as frequent intervals as is desired has been made possible by the use of the Perpetual Inventory. By its use the business man always has his finger on the pulse of his enterprise. When its action indicates an unhealthy condition, he can usually take the necessary steps immediately to remedy matters, either by going into other fields, by concentrating on the successful branches of his business, or by meeting the difficulties with immediate counter attacks while remaining in the same business. If the manufacturing concern which sustained a loss of \$40,000.00 could have ascertained from month to month what its inventories and cost of sales were, and thus determined the profit or loss resulting from the operations of each successive month, it would not have been in such difficulties at the close of the year.¹ Obviously it is of the greatest importance to the individual that he know accurately at all times the tendencies in his enterprise. It is equally important to society as a whole that all business entrepreneurs know accurately at all times the tendencies

1. Supra, p. 2.

in their respective businesses. Since results cannot be determined without inventories and since frequent physical inventories are impractical in most businesses, such accurate knowledge cannot be reached without the use of Perpetual Inventories.

The utility of the Perpetual Inventory does not, however, cease with its service to society, and to the individual entrepreneur and investor, in making possible a continuous accurate determination of the condition of a business enterprise. In addition to this general information, it provides the business manager with more specific information in regard to the details of his business and puts him in a much better position to control the manifold industrial elements under his direction. The manager or employer of yesterday worked with his men and had a closer direct knowledge of the details of his business; the employer of to-day is usually further away from the actual work; he must have at his disposal at all times facts and records to guide him in laying his plans. Speaking of this change, Marshall says in his "Economics of Industry",¹ "It has the advantage of leaving the whole time and energy of the head of the business free for what has become, in this modern phase of the division of labor, his chief work. Bagehot compares him to the military commander of modern times, who, instead of mixing in the fray himself, sits at the far end of the telegraph-wire with his head over some papers, and directs and organizes from a distance. It is his work to study changes in the markets in which he buys, and in those in which he sells; to be on the alert for new wants and new inventions, and to devise new modes of getting over new difficulties." As will presently be shown in detail², the

1. First Edition pp.115-116

2. Infra, Chapter II

Perpetual Inventory records provide the business executive with more facts for the direction of his business than any other one element. It points out assets in which he has invested too heavily; it indicates what and when he should buy; it gives him a firm basis of facts from which to plan his production and sales policies; it provides him with vital statistics for the carrying on of every branch of his business.

Enough has already been said to make clear the importance of the Perpetual Inventory to society and to the individual business. The subject merits the serious consideration and study of the economist and the businessman. It is the purpose of this thesis to inquire into the possibilities of the Perpetual Inventory and the methods employed in representative industries. It is proposed to set forth the more common and the better methods, to show the advantages of each, and to indicate which businesses in particular they can effectively serve. Furthermore, this thesis is an attempt to bring together all the important information on Perpetual Inventories, a thing which has never before been done.

In carrying out this purpose, it will first be shown in detail what function the Perpetual Inventory fills in modern industry and how it aids the entrepreneur in directing the factors under his control. Then the different Perpetual Inventory methods will be examined in turn in order of development. An exhaustive inquiry will next be made into the methods actually employed in representative mercantile establishments, retail and wholesale, and in factories. In each case where several methods are prevalent the most effective method for the line of business under discussion will be determined upon and the reasons for its especial fitness pointed out. Finally, the conditions which favor the use of the various methods, and the possibility of applying

each of the methods in other businesses of all kinds, will be considered.

CHAPTER II

THE FUNCTION OF THE PERPETUAL INVENTORY IN INDUSTRY

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THE FUNCTION OF THE PERPETUAL INVENTORY IN INDUSTRY

When an entrepreneur begins his enterprise, he purchases merchandise or material in accordance with what he thinks the immediate demands of his business will be. As time goes on, some of the goods are sold, and further purchases are made. At the end of a certain period, the entrepreneur desires to learn what the results of that period have been. In order to do so, he must know what portion of the expenditures for merchandise and materials are a proper charge against the period in question, in other words, what the cost of his sales has been. The cost of sales is an expense of the period, while the balance on hand at the end of the period is an asset. If these two amounts are properly segregated, the result of the operations of the period and the condition of the business at the close of these operations can be correctly determined.

The records of almost any business will show, or will provide data from which can be computed, all the more important items¹ of income attributable and of expense chargeable to a particular period, except the cost of sales. The records ordinarily show the selling price of sales: that must be recorded as a check on cash receipts and

1. There may be, in addition to the cost of sales, several minor items of income and expense which cannot be determined directly from the records; for instance, the amounts of interest or insurance chargeable to a period. Accruals of this kind, as well as deferred charges, can usually be computed quite easily, by reference to documents or memoranda of one kind or another. Such items are ordinarily comparatively small and unimportant.

charge accounts. But at the end of a period in which thousands of sales have been made, the cost of the goods which have been sold is not known.

The cost of sales may be found by deducting from the cost of purchases the value of the merchandise or material still on hand.¹ The difficulty lies in determining the value of the balance on hand; once this has been ascertained, the computation of the cost of sales and the profit for the period is simple. In the past the value of this merchandise was determined by counting the articles of each different kind and by applying to the quantity the cost or market price² of such articles. This method is still employed by many concerns; it is also used to obtain an additional check on merchandise by many concerns that use a Perpetual Inventory. However, this method is costly; it takes from one to two weeks and disrupts business in the meantime. Hence few businesses take a physical inventory more than once or twice a year.

The actual results of business operations can be definitely determined only as frequently as it is possible to determine inventories. If this is but once (or twice) a year, as it must be when physical

1. The difference between the purchases and the goods on hand may, in some cases, be only in part the actual cost of sales. The difference may be due in part to leakages of various kinds, as in the case of coal dealers, whose stock on hand shrinks on account of the degradation of the coal. The perpetual inventory records help to measure such additional costs which are incorporated into one unit "cost of sales", with the original purchase price.
2. Market price will be used throughout this thesis in its generally accepted meaning in books on accounting subjects. Market price refers to the price which must be paid in the open market by the business man for the merchandise at the time of taking the inventory. Cf. Robert H. Montgomery, Auditing, Theory and Practice, 1919, p. 84.

inventories are relied on, the entrepreneur is working in the dark a great deal of the time. He is in the position of a general who sends out his troops in accordance with a well thought out plan and commands them to fight furiously. He joins in the fight himself and does not take any steps to place himself where he can watch the course of the battle or secure information as to the progress of his various divisions. At the end of a three day period he calls his forces together, counts his men, gathers data on the conflict, and decides what the outcome of the battle has been. Such military procedure would be absurd, but scarcely more so than the business procedure of the manager who relies entirely on the annual physical inventory.

The capable military commander keeps in close contact with the movements of his forces. He knows at all times how the battle is progressing in every sector. He is informed of any slight reverse or momentary advantage along the line of action at the very moment of its occurrence. Thus he is able to seize every favorable opportunity, to strike when conditions are suitable, and to assure himself of victory. On the other hand, if conditions turn out to be unfavorable, he makes a strategic retreat, and attacks later from a more advantageous point. So also does the business commander, with a proper Perpetual Inventory and frequent accurate operating statements; he knows exactly how his enterprise is progressing at every moment and can act accordingly.

The Perpetual Inventory shows at any time, or at the end of each week or each month, depending on the method used, what is the value of the goods on hand. Accordingly, the operating results can be readily arrived at and contact established with the progress of the business.

In addition to the providing prompt and accurate information on
of

profits and losses, the perpetual inventory records present data in great detail on each item of stock. This detailed information is invaluable because it points out to the business executive where he is overstocked, indicates where shortages are soon likely to occur, and shows what the rates of turnover are on different articles of merchandise. The information guides him in selling, in buying, and in production. The records are very valuable in case of fire and they provide a check on theft and carelessness. They give more accurate results than the physical inventory, and in most cases do away with the expense and trouble of an annual physical inventory.

The perpetual inventory prevents overstocking. The most potent influence in bringing the perpetual inventory to the serious consideration of merchants and manufacturers in the last few years, has been the claim that it makes possible a reduction in investment without reducing the profit. When interest rates are high and when credit is of necessity curtailed, it becomes unusually important to reduce investment in stock wherever possible. Stock on hand represents real money. Unless it is earning a high rate of profit, the investment must be liquidated at the earliest possible moment. Dead stock must be found at once and got rid of. Without a Perpetual Inventory it is impossible to determine a safe minimum quantity for each commodity; there is no record in black and white which tells what issues of each article have been made in the last week or month. With a Perpetual Inventory record, dead stock is easily detected. A glance thru the cards, or the book, will show at once for each kind of article the amount on hand and the rate at which sales or issues have been made in the past. With a Perpetual Inventory, buying can be suspended, where stocks are somewhat inactive, and special selling devices can be

instituted to force sales in such lines where the stock investment in them is considerable. It is better for a merchant to sell at a loss certain portions of his stock than to allow the dead stock to retard the more profitable streams of his business.

Not only does overstocking tie up unnecessary capital directly, but it also requires excessive insurance and demands valuable floor space. Interest, insurance, taxes and rent are needlessly increased. The perpetual inventory records have the data from which the executive can determine where stock can be reduced and where no change is advisable.

The Dodge Motor Car Company of Detroit found that many of its dealers ordered parts without even an approximate estimation of the number which would be sold. Wishing to be able to provide for every emergency, dealers ordered heavily of parts for which there was a demand only once or twice a year. Then, a little later, when re-ordering, they ordered these articles again, since they had no way of determining even their approximate needs except by a physical count of many hundreds of parts. The Dodge Motor Car Company employed a firm of public accountants to devise a system of Perpetual Inventory for garages and retail dealers in car parts. This system worked so well that the company now requires its dealers to keep a Perpetual Inventory. It has been found that all the needs of customers can be met just as well with one-half the number of parts as were necessary when no Perpetual Inventory was kept. A reduction in stock investment amounting to fifty percent is a saving which can well be emulated in other lines of business.

The costs which can be eliminated by the use of some kind of a Perpetual Inventory are also brought out in the experience of a mill

in the Middle West¹ which had been accustomed to buying by guess. Buying had to be done sometime ahead of the date of delivery. Often it was found that too much had been bought of certain grains, and the excess had to be stored at the local elevator, at a comparatively high cost. At other times there would be a shortage at an inopportune time and additional stock had to be purchased at the high market price. These difficulties were to a great extent eliminated by a "Bin Card" Perpetual Inventory system.

No less valuable is the Perpetual Inventory to the factory in cutting down the investment in stock on hand. An example of its possibilities is shown in the case of the Electric Controller and Manufacturing Company of Cleveland.² This company reduced its Inventory fifty percent. After the correct amounts for "Maximum" and "Minimum" had been determined, no orders for finished parts to meet imagined shortages were allowed to slow up production orders during rush seasons. It was possible to eliminate unnecessary work on parts which would not be needed for many months. By reserving stock for every Sales Order, there was no shortage when orders were to be assembled and shipped, yet the excess over actual needs could be kept down to a minimum.

While a merchant or manufacturer must avoid overstocking, he must at the same time avoid shortages. To pass up a possible profit because of inability to fill orders shows that something is wrong with the buying or production end of the business. It leads to dissatisfied customers and reduced sales. Rush orders to meet shortages usually bring with them heavy express charges and other extra expenses. The

1. The Factory, April 1918, p.682
2. Elliot-Fisher Magazine, December 1920, pp.257-261

Perpetual Inventory with its minimum and maximum signals calls attention to a threatening shortage in sufficient time to obtain the necessary merchandise or parts thru the ordinary and least expensive channels. It replaces ordering based on impression with ordering based on facts.

Shortages in the factory are even more serious than in the retail establishment. Sometimes machines and men will be idle while awaiting supplies or parts which are essential. The overhead expense goes on just the same and the margin of profit is rapidly reduced. With the Perpetual Inventory, it is possible to determine what purchase or production is necessary far enough in advance so that no such expensive and annoying delays need be experienced. A close check on future needs is kept in most factories by entering on the stock records purchase orders made, and amounts reserved for sales or production orders. Shortages in factories, moreover, often lead to additional unnecessary investment of capital. For instance, where machines are being assembled and it is found that the work cannot be completed because of a shortage of some part, it becomes necessary to hold up the shipping of the machines in question until a sufficient number of parts have been produced or have been received from distant factories. These machines might, but for the shortage, have been shipped, the investment liquidated, a profit realized, and a new profitable investment made. With perpetual inventory records to turn to, the manager cannot fall into the error of letting shortages materially reduce the business profits.

The Perpetual Inventory records make data available which aids materially in increasing the rapidity of stock turnover. The words "rapid stock turnover" have been used in business so much during the last few years that the expression has become hackneyed. However, it still conveys the central idea of a great business principle.

Nothing can be more important in obtaining the action indicated by this slogan, than a definite and minute knowledge as to the comparative rapidity with which the various articles of merchandise are disposed of. In a small shop it may be possible for the manager to make a close estimate as to the relative rate of turnover of his various lines; but in the average and in the larger establishments, the executive would be able to make only an inaccurate guess as to the turnover rate of any but a few lines at either extreme. It is, or should be, the policy of every firm to have the goods to meet practically every request made by its customers and yet not to have any money tied up in goods which will not be demanded. This policy cannot be followed if the information which serves as a guide to the buyer is based upon mere guessing. Facts are necessary in the competitive business of modern times. The Perpetual Inventory shows which articles are selling best; it shows whether an ample supply is being carried of these articles; it indicates the average length of time each article is in stock, and at what seasons the demand for it is the greatest. A merchant wishes to know how profitable a certain article is. All he needs to do is to pull out of the Inventory File the card which represents that article. At once he has before him the entire history of that article since it first became connected with his establishment.

As a basis upon which to build selling policies, the Perpetual Inventory records are of great value. The minute knowledge of stock turnover just discussed is of first importance in this connection. Further than that, the inventory records indicate to the sales executive which articles need be advertised more than others, they show which prices have formerly produced sales, and they give in detail the results of past applications of various methods of stimulating sales.

In an establishment where goods are often sold before they have been purchased or made, as in the case of some factories, the sales department which can refer to Perpetual Inventory records can render better and more satisfactory service to its customers than would otherwise be possible, for it can ascertain with accuracy when it will be possible to deliver orders. No promises of delivery will be made which it is impossible to fulfill; at the same time no orders will be lost because the sales manager has inaccurately estimated the date of delivery too far in the future.

The Perpetual Inventory records are a reliable guide in buying and in production. The main things which a buyer or production manager seeks to accomplish are to avoid being overstocked or running short of any articles of merchandise, and to buy or produce goods which will sell. The information which will aid in this endeavor is secured, as we have seen, by the records. Many large establishments, as for instance, the Stern and Mann Company¹ of Canton, Ohio, now base their buying plans almost entirely on the Perpetual Inventory records. This company obtains accurate information on the sales, purchases, and inventories of each of its fifteen departments each month and from these decides what it shall buy. As a consequence, it has wasted no sales effort on articles which do not sell readily and it has not had capital tied up in dead stock.

The Perpetual Inventory is invaluable in case of loss of stock by fire. A plant operated by the Cadillac Motor Car Company of Detroit, Michigan was destroyed by fire December 25, 1919. The company's Perpetual Inventory records showed what stock and tools were on hand and on order at the time of the fire. These records made adjustments

1. Business, October, 1921, p.24.

with the insurance companies easy and made an immediate resumption of work possible. They furnished complete data for purposes of reconstruction and replacement.

There is no better check on theft or carelessness than well kept inventory records.¹ The knowledge by the clerks of the existence of such a record has a salutary effect: they know that everything must be accounted for and that when the periodic check is made, if there are shortages, a thorough investigation of the department will follow. Some factories lose tools worth thousands of dollars every year. Department stores frequently find expensive gowns missing. Without Perpetual Inventory records, such losses may be suspected, but the localizing of the losses and the placing of responsibility is extremely difficult. With an adequate inventory system, the occurrence of theft will be discovered very soon. Then by frequent checks of stock with the inventory records, in those departments which are under suspicion, the difficulty is usually remedied. Even if the actual culprit is not caught, the close check kept on the stock deters him from further thefts. In a concern where the management is careless about stock and about keeping any detailed records in connection therewith, the workmen also become careless and develop wasteful habits in handling the merchandise or material.

A prime requisite of an inventory is accuracy. If an inventory is not accurate, an estimate of stock on hand would be as satisfactory and would be less troublesome and expensive. The physical inventory is likely to be inaccurate. It is taken under the most disadvantageous circumstances. Everything in the establishment must be counted

1. Stanley G.H.Fitch, Deflation in Relation to Cost Accounting, Journal of Accountancy, January, 1922, p.3.

and weighed within the course of a few days. Inventory-taking does not directly produce profit and is usually rushed through in the least possible time, the clerks working overtime. In the case of retail shops, the physical inventory interferes with trade: in the case of factories it interferes with production. Often it is taken amid the confusion and noise of repairing. Mistakes are likely to be frequent: counting and weighing done under the severe pressure usually connected with physical inventories cannot be accurate.¹ In regard to Goods-in-Process the physical inventory is nothing but a guess.²

The Perpetual Inventory, on the other hand, keeps a continuous record of what is on hand. Properly kept, it will show accurately, the amounts received and the amounts issued. If there are no leaks and no errors the balance on hand must be correct. However, leaks and errors will occur even in the best establishments, and it is, therefore, necessary to make an actual physical count at intervals. When a Perpetual Inventory is kept, this can be done by the men in charge of stores, one department at the time when conditions permit, and it can be done carefully and systematically. It is possible to equip these men with better and more accurate machines for weighing and counting, since there is not so much of this to be done all in a short space of time. Moreover, those articles which are most valuable and those which are consumed or issued in the largest quantities can be very frequently checked. As above noted, this has a good effect on the stores clerks and makes them especially careful in conserving stores and in recording receipts and issues of stores.

1. H.B. Twyford, Storing, 1918, pp. 120-121

2. John R. Wildman, Principles of Auditing, 1919, pp. 116-118.

By making it possible for a firm to make a physical count of its merchandise or stock one department at a time thruout the year, the Perpetual Inventory has eliminated the annual disruption of business in the retail store and the annual shut down in the factory for inventory-taking purposes. In the retail and wholesale concern not using a Perpetual Inventory, where an entire shut down can be avoided, the annual physical inventory forces much extra work and exertion on the personnel, reduces their efficiency for their regular duties, and causes considerable inconvenience for customers. In the factory, in the absence of a Perpetual Inventory system, an annual shut down is usual. Such shut downs are very expensive, more so than the management ordinarily realizes. The overhead expenses go on just the same, salaries must be paid, machines stand idle. Nothing is produced and profits made during other periods must meet the expenses of the idle plant. Furthermore, there is a loss to the workman, who is temporarily thrown out of work, of from two to four percent of his annual earnings. The manufacturer and laborer are both losers. One Cleveland firm reports that before it installed a Perpetual Inventory system its annual physical inventory usually required a shut down of two weeks and that it slowed up production for another week. The annual cost of taking the physical inventory was estimated at \$10,000.00.. The Perpetual Inventory solves these problems by making it possible to count stores and merchandise as time permits without rush and confusion, and yet to know at all times what quantity of each article is on hand.¹

The advantages of Perpetual Inventory methods are numerous, but it must be understood that all methods do not bring the same commend-

1. Cf. *Infra* p. 71

able results nor do they bring these results in the same degree. Some methods with a special advantage, may lack other advantages entirely. For instance, the so-called "Retail Method", while giving very valuable information on some points, provides, if used alone, but little data that is of value to the buyer. Sometimes it becomes necessary to combine several methods to get the best results in a business. These points will be discussed later.

The facts, already presented, however, show definitely that the Perpetual Inventory records are very great value to the business executive. They furnish him with statistical data which affect practically every phase and every department of his business; they give him a firm basis for planning the manufacturing, buying, and selling policies of his concern: they make it possible for him to manage his enterprise in the light of past experience: they put him into close contact with the daily trend of his business, thus making possible at all times, quick and definite action.

CHAPTER III

METHODS AND THEIR DEVELOPMENT

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METHODS AND THEIR DEVELOPMENT

In business, the word inventory is ordinarily used to convey the idea of a list of the items of merchandise or material on hand in a concern on a certain specified day, the quantities or values or both being shown in connection with each item. This term has also come to be used to signify the total value of the merchandise or material on hand as of a certain specified day. Such lists and values were formerly, and often now are determined by actually counting or measuring the items in stock and then applying to each a unit cost. Such a count and valuation is called a physical inventory. A significant feature of the physical inventory is that it represents the condition of the stock on one particular day.

A list or record of the items of stock which reflects the periodic changes in balances of stock on hand without the need of a count and valuation is a Perpetual Inventory. The term, as in the case of inventories, includes records which show balances either by quantity, value, or both, and includes such as show only total stock values. A Perpetual Inventory Method is the procedure followed in keeping a Perpetual Inventory, that is, in making a periodic determination of quantities or values without a physical count.

The two main purposes of a Perpetual Inventory, as already stated, are to provide information which will make possible a continuous, accurate knowledge of the results of operations, and to present facts

for the guidance of the business executive in planning the details of his business policies. The former purpose requires only that a record of values be kept; the latter requires more particularly that a record of quantities be kept. Accordingly, some perpetual inventory methods have been devised to collect data in terms of value, while others have been devised to collect the data in terms of quantity. It is quite common to find two methods in the same concern side by side, one a value method and the other a quantity method. Sometimes two value methods are used at once, one being a check on the other. Different methods and different combinations of methods fit varying circumstances. In order that a clear idea may be gained of the various methods, and the relations existing between them before they are met with in various industries, they will be briefly discussed here. In a discussion of actual conditions, underlying principles are likely to be lost sight of in the mass of less important details which it is necessary to touch upon, unless these principles are clearly understood and are kept firmly in mind. At this point the details of methods will be avoided as much as possible. The details will be thoroughly treated in subsequent chapters in connection with the industries in which the methods are used.

We have spoken of value methods and quantity methods. In reality, there is not much choice of method where it is desired to keep a record by quantities. There are minor differences of form and of detail, but none of fundamental importance. The value inventory, on the other hand, can be arrived at by a variety of different methods. The reason for this is that in a value inventory the amounts of all items are recorded in similar terms, that is, in dollars and cents, while in a quantity inventory the amounts are of necessity not shown in similar terms; they

appear by tons, linear feet, gallons, cubic feet, pounds, etc. In the former case, amounts may be grouped by commodities, or departments, or totaled for the whole business and the result is intelligible and valuable: in the latter case, no grouping is possible, each item must remain separate and distinct. No result would be attained by adding pounds of butter to yards of calico, nor would a department store executive who was informed that there were five thousand gallons on hand, be in possession of valuable information if this quantity were included ⁱⁿ gallons of vinegar, of gasoline and of grape juice.

Four different types of value methods exist. These will be discussed under the following designations:

1. Direct Value Method
2. Departmental Cost Method
3. Retail Gross Profit Method
4. Estimated Mark-up Method.

Each of these is found in a variety of forms, and some concerns use a combination of two of the above methods. However, each method has distinct characteristics which distinguish it from the others. It might perhaps be more properly stated that there is a group of methods that are Direct Value Methods, that there is another group of methods which are Estimated Mark-up Methods, and so on.

Under the Direct Value Method, an account is kept in the general ledger or in a subsidiary ledger with each different kind of merchandise or material. This account is debited whenever merchandise is bought, with the cost of the merchandise, or with cost plus transportation charges: and it is credited with the cost of sales or issues. The balance is computed and entered either after every transaction or at the end of definitely specified periods. Originally, shops with a

few important lines of goods kept such accounts with these more important lines, and then had a miscellaneous merchandise account to take care of all other items. It has become increasingly common, however, to keep accounts with all the various kinds of merchandise carried; some establishments even keep separate accounts with each color and with each size of certain kinds of stock. The number of accounts kept will depend upon the detail desired. The strong point about this method is, that the Perpetual Inventory records show every transaction separately for each article, and the value of the balance on hand of any individual item can readily be obtained at any time. The Direct Value Method is ordinarily the most accurate of the value methods and furnishes the most information. On the other hand, it usually requires a great deal of clerical work and, therefore, costs the most to maintain.¹

The cost of maintaining the Direct Value Method has made many firms willing to dispense with the detailed information which it provides for something less expensive and they have adopted the Departmental Cost Method. This method makes it possible to determine accurately the value of the balance on hand in each department of an establishment at the end of each day, or week, or month, but it does not give any information as to the balance on hand of each item of stock. Under this method, the cost of each sale is recorded when the sale is made. At the end of the day the sales and the cost of sales are totaled by departments and the totals are entered in the Sales Journal. This journal has columns for each department, so that monthly departmental totals can readily be secured. At the end of the period the departments

1. Infra, Chapter VI, Factories.

are charged with the purchases and credited with the cost of sales and the inventory determined. This method is sometimes used in such a way that the information is collected by commodities instead of by departments, similar articles being brought together in a commodity group under such headings as "Confectionery" or "Cut Glass". The inventory then shows the value of the stock of such articles as compose the commodity group. By using the Departmental Cost or the Commodity Cost Method, the executive is able to determine for each period, the profits made by each department or commodity group as well as for the business as a whole.¹

Where a business is of such a nature that thousands of sales are made daily, and many of the sales are for a few cents only, it becomes a tremendous task to record the cost of each sale, as is necessary under the Departmental Cost Method. In some businesses where such conditions exist, and particularly in department stores, the Retail Gross Profit Method is used.

Under the Retail Gross Profit Method both the cost and retail selling price of each purchase are recorded by departments. The retail selling price of each purchase can be recorded much more readily than the cost of sales, since purchases are usually in large quantities. The percentage which the difference between the total cost and the total selling price of purchases is of the total selling price is the "percentage of mark-up". This is determined for each department from the total cost and the total selling price of the department's purchases for the period. The sales are recorded by departments also, but only at retail selling price. Since the retail value of the closing inventory can easily be computed. The depart-

1. Infra, Chapter IV, Part I, Jewelry Stores.

ment percentage of mark-up is applied to the retail value of the department inventory, and the result is a department inventory at cost. The Retail Gross Profit Method gives practically accurate results in certain businesses and requires much less clerical work than would be necessary under the other two methods described.¹

In some businesses, the Retail Gross Profit Method gives such inaccurate results that it cannot be used to advantage. This is true of any business in which there is a wide discrepancy between the percentage of gross profit on articles in the same department, and in which frequent and violent fluctuations in price occur. In some businesses which fall into this category, as for instance in the grocery business, the Estimated Mark-up Method is used. No record is kept either of the cost of sales or of the retail value of purchases as under the previous methods. The percentage of mark-up, that is, the gross profit percentage, is estimated for each department or commodity group on a basis of past experience or on some other more or less dependable basis. The net department sales for the period are multiplied by this percentage and the result deducted from sales. The cost of sales thus having been determined, the inventory and the profit for the period can be computed without further difficulty. This method is as accurate as the accuracy of the estimate of the mark-up percentage, and no more so. It is ordinarily less accurate than the Retail Method, since it does not seek to determine the gross profit on each purchase, but merely arrives at the mark-up percentage by departments or commodity groups. The Estimated Mark-up Method's main advantage is that it requires but little clerical work. Where it is possible to estimate the departmental percentages

1. Infra, Chapter IV, Part II, Department Stores.

with considerable accuracy, the method gives good results.¹

We have now considered the various methods by which a Perpetual Inventory by values may be kept. To secure a Perpetual Inventory by quantities, the Direct Quantity Method is used. There are many variations of this method, but there are practically no fundamental differences of procedure in the various industries.² In its simplest form the Direct Quantity Method requires only that a record be kept of all receipts, issues, and balances for each item of merchandise or material. The balance on hand column of the record shows the quantity inventory of the article specified. In some establishments, the information as to goods ordered and goods reserved for production orders or sales orders is also recorded and becomes an important and valuable part of the Perpetual Inventory record. This information is of the greatest importance to the executive in determining in the immediate future and what has been set aside for definite needs out of the balance on hand.³ In some factories, quantity inventories of Goods-in-Process are kept and, in certain cases, of the material in each separate process.

There are numerous combinations and modifications of the above methods. Each business in groping for the procedure which will best meet its particular problems, develops a system just a little different from any other. Concerns wishing to secure the full benefits of the Perpetual Inventory, find it necessary to keep records both by the quantity method and by one of the value methods. Without a quantity inventory record, the information secured for buying and selling is insufficient; without a value inventory, monthly operating statements

1. Infra, Chapter IV, Part IV, Lumber Dealers.
2. Infra, Chapter IV, Part III, Shoe Retailers; and Chapter VI, Factories.
3. Infra, pp. 104-106

cannot be prepared. No matter what value method is employed, the quantity inventory can be kept at the same time. In factories, especially, the most usual combination found in actual practice is the Direct Value and the Direct Quantity Methods. When this is the case, the records of values and of quantities are kept side by side on the same form; entries are made for both when articles are received or issued, and the balances are computed and entered at the same time. Such a double record kept for each article of merchandise or material, provides information in more detail than any other system. When the quantity method and one of the other three value methods are used in the same concern, the records are not combined but are entirely independent of each other, except that occasionally one is checked against the other. There are also concerns that use two value methods in order that they may have one as a check on the other. The Direct Value Method and the Departmental Cost Method are most frequently used together in this way.¹ In some cases large concerns with many departments employ different methods or combinations of methods in different departments. For instance, in a wholesale house, the Departmental Cost Method may be used alone in some departments, while in others, especially where the articles handled have a high unit value, a combination of the Direct Quantity Method, Direct Value Method, and Departmental Cost Method may be in operation.

The methods here outlined will be explained in detail in connection with the industries in which they are used. There are certain conditions in each type of business which have brought about the acceptance of certain methods or combinations of methods; in most businesses several

1. *Infra*, p. 135.

different methods are at present in use, some executives favoring one, and some favoring another. In the next three Chapters, a number of representative businesses will be examined, the prevalent methods in each explained in detail, the advantages of the different methods will be briefly set forth, and the details of procedure criticised. The criticism of the methods themselves and a discussion of their fitness in serving different types of businesses will be left for a final chapter. At that point, we shall have before us all essential information on the different systems.

CHAPTER IV

RETAIL MERCANTILE ESTABLISHMENTS

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As representative retail merchandising businesses there have been selected for examination jewelry stores, department stores, shoe stores, and lumber yards. These differ considerably in size and nature, and present all the problems ordinarily met with in installing a Perpetual Inventory system in a retail concern. In these stores will be found examples of the extremes of price fluctuation and price stability, of slow turnover and rapid turnover, of low average unit price and high average unit price. These stores, therefore, employ a variety of Perpetual Inventory systems.

I. Jewelry Stores

Retail jewelers deal in merchandise that is fairly stable in price. The turnover is not rapid and the average unit price is high. The gross profit on each article sold is accordingly also quite high, and the keeping of rather accurate records is possible as far as cost is concerned. Enough comparatively inexpensive articles are sold in most retail jewelry stores, however, so that the average gross profit is a moderate amount, and the tabulation of too much detail must be avoided. On account of the high unit price of some articles and the ease with which they can be removed, a close check must especially be kept on the higher priced items of stock.

Under the method used by many of the best equipped jewelry stores,

the general office keeps a record of stock on hand in terms of value and by commodities. No record is kept of quantities in the general office, nor is any attempt made to keep a continuous record of the balances on hand of different grades or kinds of the same commodity. It is considered sufficient to divide the merchandise up into seven or eight distinct classes - jewelry, sterling silver, plated silver, cut glass, watches, diamonds, and miscellaneous. When goods are sold a record is made, not only of the sales price, but also of the cost of sales. Accordingly, at the end of each day, or week, or month, the cost of sales can be determined and an accurate inventory can be arrived at. Such a Departmental Cost Method is used by several of the largest jewelry stores in the Northwest.¹

When goods are bought, and the invoice received, the proper entry is made in the Purchase Journal, the amount of the invoice appearing in the Merchandise Purchase Column in the usual way. In addition to this, the invoice total is distributed in the commodity columns, of which there is one for each special classification of merchandise desired, with an extra column for miscellaneous items. The total of the Merchandise Purchases column is later posted in the general ledger as a debit to the Merchandise Account, thereby increasing the goods on hand as shown by this account. The commodity column totals are not posted; they serve as an analysis of the Total Merchandise Purchases Amount which is posted as explained above. If desired, a Purchase Account may be kept, in which case it is closed into the Merchandise Account at the end of the month.

Returned Purchases are provided for in the Purchase Journal also.

1. White and MacNaught of Minneapolis may be cited as an example.

When the goods are sent back to the vendor, a note is made out covering all the essential facts in connection with the transaction. This is filed, and no other record is made until a credit memo is received from the vendor. Upon receipt of this memo, entry is made on a special page in the Purchase Journal, a page which is provided for the month's returned purchases. The rulings are identical with those of the Purchase Journal proper: the entry is really just the reverse of the entry made at the time of the purchase. The totals of the columns in this division of the Purchase Journal are deducted, at the end of each month, from the totals of the Purchase columns before they are posted.

A tag is attached to each article before it is placed on sale. This tag has marked on it the price at which the article is to be sold and its cost. The latter amount is in code. When the salesman makes out his sales slip covering the sale of the article, he marks down both the selling price and the cost. One copy of this sales slip goes to the general office and the salesman keeps one. At the end of the day the salesman makes out a report called the Sales and Collection Summary. He makes it out from his duplicate sales slips. At the top of this Individual Sales Summary, spaces are provided for the date and the clerk number. There are four divisions into which the columns may be grouped; the first being Explanatory, the next Debits, the Credits, and finally the Detail of Sales. Under Explanatory are columns for slip number, customer's name and nature of transaction. Under Debits are columns for "Customers" and "Cash": under Credits, "Customers", "Merchandise 5% Tax," and "Merchandise No Tax". Under the Detail of Sales are columns providing an analysis of sales by commodities. There are two columns for each commodity, one for cost and one for sales price. Such double columns are usually provided for the following

groups: jewelry, sterling silver, plated silver, cut glass, watches, diamonds, miscellaneous. Single columns only are necessary for "Watch Repairs" and "Shop Repairs".

The Individual Sales Summary is sent in to the cashier. He checks the original Sales Slip, which was sent in at the time of the sale, against the Individual Sales Summary made out by the salesman. If he finds no errors, he enters the totals of the Individual Sales Summary Columns on the Cashier's Sales Summary which is a form practically identical with the Individual Sales Summary. When the data submitted by all the salesmen have been entered in this way, the Cashier's Sales Summary contains a record by separate commodities of all sales for the day both as to salesprice and cost of sales.

The daily totals by commodities, as well as the totals of all commodities together, are entered in the Sales Journal; this has practically the same columns as the Individual Sales Summary. The totals of the columns in this Sales Journal show the monthly sales and cost of sales by commodities and in total. The total cost of sales is credited to the Merchandise Account in the Ledger at the end of each month. The sales of each commodity do not enter into the general stream of accounting. They serve merely as an analysis of the total monthly cost of sales, which figure does enter into the general accounts.

It will be seen that at the end of each month, the Merchandise Account reflects the true cost of the goods on hand. It originally showed the balance on hand at the beginning of the period. It has been debited with the total purchases and credited with the total cost of sales. The new balance must, therefore, be the merchandise on hand at the end of the period.

It will often be desirable to know the cost value of the balance on hand of certain commodities. An analysis of the balance on hand is, therefore, provided as completely as is the analysis of sales and the analysis of purchases. The following Inventory Summary is kept either in a special Inventory Book or among the statistical records. There is a page for each commodity.

Inventory, January 1
Plus Purchases for January (from Purchase Journal)
Total
Less Cost of Sales for January (from Sales Journal)
Inventory, January 31
Plus Purchases for February
Total
Less Cost of Sales for February
Inventory, February 28

This record is added to each month, so that an accurate inventory of the cost value of the balances of each of the commodities is available at the end of every month. The total of the balances of the commodities computed in this way must equal the balance in the Merchandise account.

This inventory is an inventory of values only. Each department must keep its own record of quantities. It is an inventory at cost, and does not reflect fluctuations in the market price. During normal times, market and cost will not differ very much. Under unusual conditions, the difference may be considerable. If a physical inventory is taken annually it will usually be necessary to make some adjustment at this time for bookkeeping errors which have crept in during the year. Some of the difference may be due to errors made by the

salesmen. If the annual physical inventories are taken at cost, any discrepancy between the perpetual and the physical inventory will be due to errors or to leaks of some kind, possibly thefts by the salesmen. The Perpetual Inventory is invaluable in bringing such leaks to the attention of the executive. If the physical inventories are taken at cost or market, whichever is lower, however, the discrepancy is likely to be considerable, and will in the main be caused by the spread between cost and market. In any case, the new year should be begun with the physical inventory as a basis.

This method makes possible the preparation of profit and loss statements at the end of every month and the determination of progress or regress in each department from month to month. It puts the manager in close touch with the different departments and shows him at frequent intervals just what the conditions are in each. It calls his attention to the amount of money which he has invested in each class of articles. By comparing his present investment in each commodity group with his investment in the past, he is able to guard against accumulating too large a stock in any particular line. The Departmental Cost Method, as outlined above, provides for a determination of the balances on hand at the end of every month. If desired, the balance may be arrived at every week or every day. Even if it is usual to obtain the monthly balance only, the bookkeeper can, at any time and on short notice, obtain the balance on hand of each commodity as well as the total. It should be observed that the balance of the Merchandise Account always shows the inventory at the beginning of the month in question, and the Inventory Summary gives the inventory of each commodity at the beginning of that month.

As previously stated, each department keeps its own record of

quantities on hand. In some departments, a record is kept of the quantities of each of the different kind of articles; in other departments, because of the high unit value of the articles sold, a complete record of each individual article is kept. By running through the Watch Record or the Diamond Record, one can readily get a list of the unsold watches or diamonds and their cost. This cost should agree with the inventory computed by the general office for that particular commodity. The general office record is, however, entirely independent of any department records as to stock and forms a splendid check on the departments.

The value inventory calls attention to the investment in stock in each department, but it is the quantity record in the departments which shows what items are being carried in excess of immediate needs. Reference to the quantity records will show where less stock should be carried; the records do not only give balances on hand, but they also indicate the frequency with which sales have been made in the past. The necessity of carrying additional stock in some lines to avoid shortages is also made evident by the quantity records. These records accordingly, serve to determine what, when, and how much to buy.

Nearly all jewelry stores keep some record of quantities, especially in the departments which deal in the higher priced articles. Many firms, however, keep no value perpetual inventory whatever. The executive in such establishments knows very little about the results of his business operations until the annual physical inventory is taken. Throughout the year he knows only in a hazy way whether or not his business is making a profit, and he has no way of telling which departments are earning and which are losing money.

Some jewelry stores have experimented with various Estimated

Mark-up Methods. They have computed percentages of mark-up for each department either by taking an average of the gross profit percentages of previous years or by estimating the current gross profit from a study of purchases and sales. Since prices of jewelry do not fluctuate very much, and since percentages of gross profit are fairly uniform, the results so attained are likely to be more satisfactory than in some businesses. The results, are nevertheless, merely estimates and not entirely reliable. No Estimated Mark-up Method merits great consideration in a business in which the average unit price and gross profit is great enough to warrant the maintenance of an accurate system in which the inventory at the end of the period is determined from the merchandise transactions of that period. The retail jewelry trade is such a business. The unit price and the gross profit on each sale in a jewelry stores is so great that the cost of making the entries under the Departmental Cost Method is but a fraction of a percent of the gross profit. The Direct Value Method would cost so much more to maintain, that any advantages to be gained from it used would not be sufficient to warrant the additional outlay.¹

The combination of the Departmental Cost Method with a more or less elaborated Direct Quantity Method will, accordingly, best meet the requirements of retail jewelry stores. Such a system will make data available monthly on the results of business operations by departments and for the organization as a whole. It will aid in buying and selling, will help to reduce the stock investment, and will form a check on theft and carelessness.

1. For a thorough discussion of the relative cost of the different methods see Chapter VII, pp. 131-133.

II. Department Stores

Department stores have their own peculiar problems to contend with, problems which definitely influence their choice of Perpetual Inventory systems. Department stores deal in a countless number of dissimilar articles. Some of these are of high unit price, more of them are of low unit price. Some are easy to take a physical inventory of; others are not. Some have rapid turnover; others have not. How can any system properly take care of such a variety of different articles?

The Direct Value and the Departmental Cost Methods require entirely too large a clerical force: they are out of the question. The task of keeping records by either method would be stupendous. Where ribbon is sold for fifteen cents, or popular music for ten, the time required to enter the cost of sales for each sale on the sales slips and again on the Recap Sheets, will in many cases absorb the entire gross profit, to say nothing of other clerical work connected with such methods. The pricing out of issues, alone would be an almost impossible task.

The Estimated Mark-up Method has been used with some success in individual concerns, but most of them have discarded estimated mark-ups for the more accurate results obtained by the Retail Gross Profit Method.

This method appears in department stores in a variety of forms, but its main characteristic is that merchandise is received into stock

at the retail or probable selling price. Thus receipts and disbursements of merchandise are made, as far as the Perpetual Inventory records go, in the same terms - retail prices. This method seeks to eliminate the difficulty arising from the fact that goods are purchased at cost and sold at retail, two unstable quantities continually varying in amount and proportion. While in a department store it is almost impossible, and certainly impractical, to keep in view the cost of each individual article sold, it is not difficult to determine the retail price of goods when they are received. Knowing the retail value of purchases, of the balance on hand at the beginning of the month, and of the sales, it is a simple matter to determine the retail value of the inventory at the end of the month.

To determine the cost inventory from the retail value, this latter amount is multiplied by the difference between 100% and the percentage of mark-up. "The percentage of purchase mark-up is computed as follows: The value of all merchandise as received, is recorded by departments at two prices, (a) invoice cost plus transportation and (b) original retail sale price. The cost and retail values are accumulated as recorded during the year. The total retail value minus the total cost value equals the total purchase mark-up, which divided by the total retail value gives the percentage of purchase mark-up."¹

All firms do not include transportation charges in the cost of purchases. Some concerns record orders in the same way as receipts, and in determining the purchase mark-up at any time, the cost of the season's orders are added to the cost of receipts, while the respective retail values are also added. During the year, it will be ob-

1. Article 1588, Regulations 45 of the United States Internal Revenue Department.

served, the purchase mark-up is likely to vary from month to month, changing as the ratio between the total retail of receipts and the total cost of receipts changes.

So far the matter is simple enough, but in most concerns the situation is complicated by occasional mark-downs, and in some cases by additional mark-ups. Whenever this happens, the ideal uniformity of valuation is thrown out of balance. Issues are no longer at retail. However, if we add all mark-downs to actual sales, the result is sales at the original retail valuation. Similarly, if we deduct all additional mark-ups when such occur, from actual sales, we obtain sales at original retail. Our formulas for finding cost inventories then become:

1. Beginning Inventory at Retail + Purchases at Retail
- (Sales + Mark-downs - Mark-ups) = Ending Inventory
at Retail, or
Beginning Inventory + Purchases - Mark-downs + Mark-ups
- Sales = Ending Inventory at Retail.
2. Retail Inventory times (100% - Percentage of Mark-up) =
Cost Inventory.

The information necessary for computing the inventory at the end of the period by the retail method is collected on some such forms as the one illustrated in Figure 1. Only the portion of the form directly involving the determination of inventories is here shown. This includes columns for purchases, mark-up percentages, additional mark-ups, markdowns, sales and inventories. The complete Gross Profit Synopsis would include columns for cost of sales, gross profit, discounts taken, and other data of interest to the executive. Each department has its individual record and the business as a whole is represented by a similar analysis, the amounts shown on this latter record being the totals of the amounts determined for each department.

The average department store has from twenty-five to sixty or seventy departments. At the end of each period the Gross Profit Synopsis Book or Merchandise Synopsis Book will show the inventory of the goods in each of these departments and the inventory of merchandise for the entire concern.

Purchases are shown on the synopsis form both at retail and cost. Each invoice received shows the cost: the buyer enters on the face of the invoice the retail or selling price of the merchandise. Cost and retail are entered from the invoice in separate columns in the Purchase Register. The monthly total of these columns are entered in the proper spaces in the synopsis. Some concerns add all transportation charges to the cost before entering, others do not. It is sometimes difficult to determine the correct freight or express charges at the time of the entry, and the wrong department may at a later date be charged with the transportation charge. Some firms add an item called "loading" to the cost. This amount equals ten percent of the cost and acts as a factor of safety.

The percentage of mark-up is determined by dividing the difference between the retail and cost by the retail. This is done first by using only the amounts which represent the purchases by the month, and then by using the amounts on the "To Date" line. These include the original inventory figures and the purchases to date. It is desired to know what the percentage of mark-up is both for the month just closed and for the season to date.

When goods are subsequently marked up or marked down, the buyer makes out a mark-down slip. This is forwarded to the main office and is entered on a special page in the Sales Journal. Sometimes a special Mark-down Book is used. The Mark-down Slips are numbered serially so

that none will be overlooked when the entries are made. Some difficulty is sometimes experienced in getting buyers to make out mark-down reports promptly. If mark-downs are not properly recorded, the inventory figures will be false. The totals of the mark-downs columns are transferred to the synopsis. The inventory deductions are mark-downs and sales; the sum of the two represent the amount by which stock has been reduced in retail value. The sales slips provide the information in regard to the sales made by each department. This data finds its way into the synopsis by way of the Sales Journal.

Now that we have all this information brought together in one place, we can readily determine the department's inventory at the close of the period. The "To Date" quantities are determined, and these are used in computing the merchandise on hand. The retail purchases amount includes, it will be observed, the inventory at the beginning. Inventory at the beginning plus purchases minus the quantity obtained when mark-downs are added to and additional mark-ups are subtracted from sales gives the closing inventory. The result is entered in the column for inventory at retail. The inventory at cost is then obtained by subtracting the percentage of mark-up from 100% and multiplying the retail inventory by the resulting percentage. We now have a record of the cost value of the merchandise on hand and a record of the amount for which this merchandise should sell.

The only amount of the above which enters the regular financial records of the concern is the total cost of sales for all departments for the period. This amount is modified and affected by all the entries in the Gross Profits Synopsis, but it alone is posted in the General Ledger. Merchandise Purchases Account is credited and Sales or Trading Account is debited with the cost of sales.

Several difficulties are usually encountered which, if not closely watched may vitiate the value of the records. These difficulties arise from delayed invoices and from the failure of buyers to report all mark-downs. Goods for which no invoice has been received at the end of the period will not be included in the inventory. This is not, however, as much of a problem as that of getting all the buyers to report all their mark-downs and additional mark-ups promptly. When a mark-down is not reported and does not show on the records, the inventory at the end of the month is overstated by the amount of the mark-down. To avoid the possibility of buyers not reporting mark-downs, various checks have been devised. In some stores special "Mark-down Crews" pass on all mark-downs before they are made. In other firms, it is required that all price tags be printed. In either of the above cases, mark-downs can be checked from the reports of the "Mark-down Crews" or of the printer.

In most department stores the Gross Profit Synopsis is prepared at the end of every month. Some, however, make it out only quarterly, while still other compute their inventory semi-monthly. Many concerns make out weekly reports of a less formal and accurate nature in which they use this method of arriving at their inventory; but the percentage of mark-up used, is the one determined at the end of the previous month, this being considered sufficiently correct for reports merely constructed to show the weekly trend of business. Physical Inventories are taken semi-annually, in some cases, annually. They are not taken at cost or market, but at retail.

In some concerns where the records are kept very carefully, the retail method inventory and the physical inventory have shown a remarkably small difference. A Buffalo store is reported to have been

but \$29.50 off on a million dollar inventory at the end of a six months period. A two percent discrepancy on total valuation in any department is considered permissible in normal times. If the discrepancy exceeds two percent a special investigation of the department is advisable. Departments which do not come out correctly at physical inventory time, within a reasonable limit, are required to take a physical inventory at the end of every month until they are able to make a satisfactory showing. This requirement is a most distasteful punishment and creates exceptional care in the keeping of the records. While a two percent discrepancy is the largest permitted a department when trade conditions are normal, experience has shown that under the conditions existing in a year like 1921 larger discrepancies may be expected. The case of the Whitney MacGregor Company, a Minneapolis department store, may be used as an illustration. The physical inventory taken early in January 1922 showed a discrepancy of approximately four percent in the Perpetual Inventory. The greater portion of this difference was a result of the great and frequent mark-downs made in all the departments throughout the year. Since inaccuracies in the retail method Perpetual Inventory are usually caused by errors and oversights in the recording of mark-downs, it is obvious that with twice as many or twice as great mark-downs, the errors arising in connection therewith will be twice as large. It will be seen, therefore, that the accuracy of the method depends to great extent on the aggregate amount of the mark-downs.

It is in part for this reason that the retail method does not function successfully in the grocery departments. Fluctuations in the prices of many lines of groceries are frequent and great, and require innumerable mark-downs and additional mark-ups. There is, moreover,

no uniformity in unit prices or in percentages of gross profit in the various commodities sold. On account of these handicaps, it is not advisable to extend the retail method inventory to the grocery departments. Either an Estimated Mark-up Method should be used, or the merchandise should be so arranged that a physical inventory can readily be taken every month.

Except for the above considerations, which are either temporary or localized to one department, the retail method is very satisfactory in department stores as regards accuracy. An error of two percent in several departments is not a serious discrepancy, and in view of the other great advantages of the Retail Method need not be dwelt upon. These advantages are that the cost of maintenance is low, that inventory losses are taken in the months in which they occur and that systematic thefts are quickly discovered.

By using the retail method it is not necessary to keep a record of the cost of sales by the use of code, an impossible method where many small articles are sold and where the sales are numerous. The amounts used in the computations are retail values, which are easily determined for both purchases and sales: and the necessity of directly using cost values is obviated; records of cost can not readily be kept for sales. The executive in charge of the records of one of the larger department stores in Minneapolis states that the additional cost incurred by keeping the value Perpetual Inventory records amounts to less than one hundred dollars a year.¹ All the work done which would not be done in the absence of such records consists of preparing the Gross Profit Synopsis and of keeping a closer check on mark-downs.

1. This firm does not desire to have its turnover or the size of its stock investment stated.

In the aggregate, this executive estimates the additional work requires the attention of one twenty-five dollar a week clerk for two days a month. On such a basis, the cost of the retail method Perpetual Inventory to even the largest Twin City department store would not be much over two hundred dollars a year. Perhaps this estimate is low, but certain it is that the cost of maintenance of the system is nominal when compared with the advantages it secures.

Under the retail method, losses in inventory are taken in the month in which they occur, since the increased mark-downs reduce the stocks accordingly. Under most methods such losses show up only at the end of the season or year - when physical inventories are taken. In this respect, the retail method inventory is more exact than most other methods used. It should be observed that under any method which gives inventories at market, or which gives inventory amounts that are in anyway modified by market prices, a difference in total inventory value at the beginning and at the end of a period, is not due alone to the discrepancy between purchases and cost of sales for the period. It is due in part to a reduction in salability caused by changes in style, by changes in the general business situation, and by other minor causes. Where the Retail Method is used, losses due to reduction in saleability are taken in the months in which they occur and are not postponed until the end of the year.

Department Stores lose much valuable merchandise through the thefts of their clerks or of outsiders. Several Twin City Stores have had their attention called to systematic looting of high priced merchandise in certain departments, by the Perpetual Inventory records, and have been able to take precautions which have saved thousands of dollars

of merchandise.¹ When the Perpetual Inventory records disagree radically with the results of the semi-annual physical inventories or of intermediate physical checks, the assumption may be made that some merchandise has left the store for which there is no record of issue and an examination made accordingly.

The general office determines by the retail method the inventory of each department in dollars and cents at certain definite periods. In addition to this, it is quite common for some of the departments to keep a Perpetual Inventory of merchandise by quantities. Usually the departments which handle the higher priced goods, such as the "Ready to Wear" departments keep these records. They may be entered on cards, or in stock books. If stock books are used, the left half of the record gives a full description of the merchandise; the right half is divided into sections, one for each color and size. When garments are received, tallies are made in each section, one for each garment belonging in that particular group. Data as to sales are received by using special price tags, one-half of the tag being torn off and put in a box. These tags are turned over to the stock recorder who arranges them in convenient order and then goes through the stock book cancelling all tallies which represent the garments which have been sold. A line is struck diagonally through the tallies which are to be cancelled. This record serves as an aid in ordering, is a further guard against theft, simplifies the taking of the physical inventory, and may be used to check up the correctness of the value inventory.

The Retail Method Perpetual Inventory accordingly is the best adapted of all methods to the conditions of the department store business.

1. E.E. Atkinson and Company and the Whitney MacGregor Company of Minneapolis.

With this value method is combined, in all departments which deal in fairly high priced articles, the Direct Quantity Method. By this means the advantages¹ of value, and to a limited extent of quantity Perpetual Inventories are secured, as has been pointed out, at a very low cost and with sufficient accuracy for all practical purposes.

1. Supra, Chapter II.

Figure 1

PORTION OF GROSS PROFIT SYNOPSIS

Inventory of Retail Method

DEPARTMENT #

Period Fall 1921	Purchases		Percentage of Mark-up		Additional Mark-up			Inventory Deductions		Inventory		
	Retail	Cost	Exclusive of Inv.	Includ- ing Inv.	Amount	%		% of Mark down	Amount of Mark-down	Amount of Sales	Retail	Cost
Inventory August To Date												
September To Date												
October etc.												

III. Shoe Retailers

A Quantity Perpetual Inventory can readily and profitably be kept in a shoe store provided one is satisfied with information as to the quantity on hand of each stock number. The value of each article is great enough so that it is worth while to keep the necessary records of purchases, sales, and balances of each stock number. But if one desires to keep a record of the quantities on hand of each size and width of each stock number, the task becomes one of considerable magnitude. Consider the average stock number. It is represented by twelve or fourteen sizes and seven widths, or from eighty four to ninety eight different combinations. Instead of one record for each stock number, we have eighty four. The difficulty is obvious.

However, it is important that the entrepreneur should be informed, by some means, what the balances on hand of the various sizes and widths are, and what the comparative rates of turnover are. One of the shoe retailer's greatest problems is the accumulation of end sizes and left overs, dead stock. He may make a handsome profit on most of the sizes and widths of a certain stock number and then find that by disposing of the odds and ends of that stock number at a sacrifice, the profit as at first computed has been largely wiped out. If these odds and ends are not sold below cost, the loss is taken just the same - in increased interest charges and slow turnover. The remedy lies in knowing which stock numbers, and which sizes and widths of each stock number, are moving and which are not.

To a certain extent it is true that the buyer can more easily

dispense with information as to sizes and widths, than with records on stock numbers. The reason for this is that tables have been prepared for each section of the country which indicate how many pairs of each width and size the retailer should buy for each hundred pairs ordered of any one stock number. Buyers rely a great deal on these tables; but it has been found that each store shows a slightly different proportion of sales of the different sizes and widths, a proportion which depends upon the class of trade which they serve. For instance, the proportion which is correct for a "Booterie" on Upper Nicollet does not apply to a permanent "Bankrupt Sale" shoeshop on Washington Avenue. The difference is not great, of course, but the buyer cannot rely entirely upon the tables. He must have something in addition to guide him.

A simple Direct Quantity Inventory has been tried by some shoe retailers. The records are usually kept on cards, some such form as the one shown in Figure 2, being used. At the top on the left is shown the name, kind, style, and sizes. To the right, information in regard to orders and receipts is entered. A few spaces suffice for this information. Most of the card is taken up with sales. Separate divisions are provided for each size and information is entered covering date, amount sold, and amount on hand. The balance is always kept up to date, being increased upon each receipt and decreased with each sale. By this method, the manager is always kept informed as to the amount of stock he has on hand, what stock numbers and sizes are moving, and what he should buy. The record is faulty, however, in not providing information on widths. A merchant should know which widths are not moving, and which are moving rapidly. It is possible, of course, to have a number of cards for each stock number and so provide columns for every combi-

nation of size and width, but such a record would be very awkward to maintain. The clerical work required to keep the records, even without the addition of columns to show the widths for each size, is great considering the amount of information obtained.

The Bureau of Business Research of Harvard University in accordance with its policy of collecting data for retailers and wholesalers, has devised a system of stock keeping for shoe retailers¹ which is based upon the assumption that the endeavor to keep a Perpetual Inventory of sizes and widths, as well as of stock numbers, will increase the overhead expense of the average retailer to an extent which the value of such a procedure does not warrant. The Bureau has endeavored to retain for the system as many as possible of the advantages of a Perpetual Inventory while at the same time avoiding those details which, in themselves desirable create so much clerical work that they would eventually force the retailer to abandon the entire system. To the Perpetual Inventory of stock numbers has been joined a system of frequent physical count of sizes and widths, the count being taken only of such stock numbers that for some reason demand it.

When the manager, or in the larger store the buyer, decides to order some shoes of a certain stock number, he gets out the Order Record (Figure 3) for that particular stock number. He carefully considers all available data which may guide him in buying and then proceeds to fill out the Record. This record consists of ninety-eight large squares - one for each possible combination of size and width. Each of these squares is sub-divided into twenty small rectangles. Each of the first sixteen small rectangles contains a record of the number of pairs of shoes ordered of that size and width on the order

1. Harvard System of Stock Keeping for Shoe Retailers, 1916.

which bears the corresponding number. Each of the sixteen squares represents an order. When an order is sent in for a stock number, and no pairs are ordered of a certain size and width, a cross is put in the rectangle where the quantity ordered would otherwise have been entered. In other words, when the fifth order for a stock number is made out, the fifth rectangle of every large square is filled in, either with a quantity number or a cross. After the manager has made an entry in the fifth rectangle of every square, he makes out his order blank from this Order Record and forwards it to his wholesaler.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
I	II	III	IV

Key to Order Record

The first sixteen squares are for the quantities ordered on each order number. Square I shows the number of pairs on hand at the beginning of the year; Square II, the number of pairs bought as shown by the Order Record; Square III, the number on hand at the end of the year, and Square IV, the sales. The first sixteen squares are a record to be used during the year; the last four, are a summary of the year's transactions in connection with a particular size and width.

Further information as to orders appears in the Record of Receipts (Figure 4) of which there is one for each stock number. A section is provided for each of the sixteen orders for which there are rectangles on the Order Record. The entry here is for the total of all sizes and

widths of the stock number. Order number, date, number of pairs, and delivery date promised are entered in the spaces to the left. Under "Receipts" on the right are four columns; these facilitate recording where a single order is received in two or more shipments. For each shipment a record is made of the date received, the number of pairs in the shipment and the number of pairs on that particular order which have not as yet been delivered. Each order is kept entirely separate from every other order as is shown by the use of a different section for each. The first four columns are filled out from the order blanks: the other columns derive their information from the Goods Received Memo.

We have now provided for incoming merchandise. For outgoing merchandise a Sales Summary Sheet (Figure 5) is used. The first column on the left is for the stock number; then there are four divisions, each for a different week. In these divisions are columns for Sales Tally and Sales Total. At the close of each day the sales slips are gone over and the Sales Summary brought up to date. For each pair of shoes shown to be sold on the sales slips, a check is made in the "tally" column on the line opposite the stock number of that particular pair. At the end of the week the tallies are counted for each stock number and the total entered in the total column on the right. This Sales Summary then shows the total weekly sales of each stock number. Similar information is collected in connection with sales returns and is entered in the next two columns to the right.

The information tabulated on the Record of Receipts and the Sales Summary Sheet is brought together on the Stock Record (Figure 6). There is one Stock Record for each stock number. The Stock Record is divided up into twelve columns, one for each month in the year. On

the left are the line headings. At the top of each column is entered the number of pairs on hand at the end of the preceding month. Beneath this amount, receipts as shown by the Record of Receipts are entered at the end of each week during the month. The quantity is determined by adding all amounts received on dates falling within the week in question. The weekly receipts are added together to obtain the Total Receipts for month. The Sales Returns are taken from the Sales Summary Sheet and are entered in monthly total. There are usually comparatively few returns and it is, therefore, unnecessary to show the weekly amounts. The next amount, computed from the figures previously entered gives "Total on Hand, Receipts and Returns".

The sales are shown in weekly totals followed by the total sales for the month. Total Sales to Date is the cumulative total of the Total Sales-Month: this amount does not directly affect our Perpetual Inventory record. The balance on hand at the end of the month is arrived at by deducting the total sales for the month from the total of the quantities on hand, the receipts, and the sales returned. This balance is entered at the top of the next column to the right. This is the quantity which is used in determining the Inventory at the end of the period when the Operating Statement is prepared.

It should be observed that the Sales Summary covers all the stock numbers on one form, but that a separate Order Record, a Record of Receipts, and a Stock Record, are kept for each stock number. The Sales Summary Sheet is intended to record all the sales and returns for one four week period, but the other records are, under ordinary circumstances sufficient to collect all the information for an entire year. The homogeneity of the Order, Receipt, and the Stock Records make it advantageous to keep these three records for each stock number

together. The three forms are, therefore, printed on a rather large sheet of heavy paper with the Order Record covering the upper two-thirds of the sheet, the Record of Receipts in the left hand lower portion and the Stock Record in the lower right hand corner. This sheet is known as the Consolidation Sheet. At the top of the sheet is entered the stock number, description, make and year. These forms may, of course, be printed separately and on cards if desired, but the advantage of having the three records together on one sheet are almost conclusive.

As an aid to buying, nothing could give more clear and valuable information than these stock records. The Sales Summary Sheet points out which stock numbers are moving rapidly, and which ones are moving slowly. The Record of Receipts shows what quantity is on order and has not yet arrived. It indicates how promptly orders have been filled in the past and how soon the merchandise may be expected if ordered now. The Stock Record gives the number of pairs on hand at the beginning of the month, and the receipts recorded and the sales made up to the end of the last week. A complete history for the year of each stock number is available for the buyer, and a careful, if rapid, consideration of these records before ordering will assure quick stock turnover and increase profits.

This method differs from the one first discussed in several important respects. In the first place, it seeks to keep a continuous record of stock numbers only. The information on particular sizes and widths is obtained by a physical check which will be described below. This reduces the number of different records which must be kept and the number of balances which must be computed. Secondly, the records of receipts and of sales are separated, and are brought together only periodically - once a week. This separation facilitates the making

of entries. On the other hand, this method makes it very difficult to determine the balance on hand of a stock number at any time but the end of a week or a month, since at that time only are the receipts and sales totaled and entered on the Stock Record. Under the simpler method, the balance on hand can be readily ascertained from the stock record at any time.

The method devised by the Bureau of Business Research, as far as it has been described, is faulty in one important particular. No record has been provided which secures information as to balances on hand of the different widths and sizes. We have a complete history of each stock number, but only meager data as to what widths and sizes compose the stock number quantities. To have money tied up in sizes and widths which are not often called for, even though they may be of a popular style, is fully as bad as to carry a large stock of slow moving styles. On the other hand to have a Stock Record of each width of each size for several hundred stock numbers would, indeed, be a tremendous undertaking. This system has solved the problem by providing for physical count of the sizes and widths composing any stock number whenever data of this nature is required. The Sales Summary Sheet and the Stock Record will determine when a "size-up" should be made. Stock numbers which are moving rapidly will demand frequent check. Normally moving stock numbers will usually only require attention just previous to reordering. Stock numbers which are moving slowly will probably require frequent size-up, so that prompt steps may be taken to dispose of such sizes and widths as will not be sold in the ordinary course of business. The count is entered on a Size-up Sheet. Each stock number has its own sheet. This is attached to the Consolidation Sheet for the corresponding stock number. It determines

which sizes and widths are to be ordered, after the other records have shown the number of pairs required of a particular stock number. The Order Record is filled out accordingly.

This method, accordingly, eliminates a considerable portion of the clerical work of the first method. When a sale is made, there is no need of finding a certain card among a great number of cards and of selecting a particular column on that card. All the sales entries are made on one sheet and a day's sales can be entered very rapidly from the sales slips. Balances on hand for stock numbers only need be computed and that periodically. The method requires some additional entries in connection with orders, but this increased work is fully compensated for in the additional information secured. By accumulating information relating to each distinct phase of merchandising on separate records, the method, moreover, places the data before the executive in a form which makes a comparison easy and which makes the tendencies of his business more apparent. It is true that under the Harvard method, the balance on hand of any stock number cannot be readily determined at any time, as it can under the method first described. It is, however, but seldom that the quantity on hand of a stock number need be known more frequently than once a week. In view of these various considerations, the method of separating the Perpetual Inventory record into sales, receipts, order, and stock records, and of keeping the Perpetual Inventory of stock numbers only, seems to be by far the better method for the average shoe retailer.

The inventory methods discussed are quantity inventories only: when values are desired it becomes necessary to price the quantities shown to be on hand. In the average business, pricing a quantity inventory is almost as great a task as taking a physical inventory, but

in the shoe store it is not. Each stock number, while made up of a great number of combinations of sizes and widths, has a uniform unit price. Since a large shoe store ordinarily carries only from two to four hundred stock numbers, a value inventory can be taken in this way quite readily.

To keep a value Perpetual Inventory record by combining a Direct Value Method with one of the quantity methods would not be advisable in the retail shoe business, as the additional results to be gained by such a procedure would be small, while the cost of the additional clerical work necessary to secure an entry in dollars and cents at the same time as the entry for quantities is made, would be considerable. The Departmental Cost Method, however, is applicable to the conditions of the shoe trade, and a system much the same as that described for jewelry stores may be used to advantage.¹ Very few sales are for less than three or four dollars; the unit price and gross profit are great enough to warrant the use of an exact method. Not more than four or five departments would be necessary for the grouping of the merchandise; in that respect no complication would arise. In general, the Departmental Cost Method and the method of pricing quantities secured from the quantity records will give equally valuable information. The latter method is superior in one respect. Since the pricing will be at market at the end of each month, a loss caused by a drop in the price of various items of stock on hand will be reflected in the operating statement for the month in which the drop occurs. The loss will be taken immediately. Under the Departmental Cost Method, sales are issued from stock at cost price regardless of the prevailing market price, and an entire adjustment for the fall in value of stock

1. Supra, pp. 31-37

is not made until the time when a physical inventory is taken. The respective advantages and disadvantages of two value methods must be weighed against each other in the light of the conditions of the particular business where the system is to be installed. Any Perpetual Inventory system to be adapted to the shoe retail trade must accordingly, have as one essential a Direct Quantity Perpetual Inventory of stock numbers; to this should be joined a method of physical check of sizes and widths, and a value inventory of the Departmental Cost type or one secured by directly pricing the quantities on hand.

Companies operating chain shoe stores have experimented a great deal with perpetual inventory methods of various kinds, and they have contributed materially to the development of various details of the Direct Quantity Method. The experimentation has been due in part to their financial ability to carry on work of this nature and to the possibility of value accruing to each of many stores from a system successful in any one store; but chiefly it has been due to the need of an adequate check on the store manager thousands of miles away. Chain store companies now practically all require their stores to keep records and submit daily reports on stock balances. A record is kept at the store, usually for each stock number, showing the balance on hand at the last inventory and the daily or weekly receipts and sales. From this the information as to balances on hand by stock numbers is readily obtained. The reports are made daily and show daily receipts, sales, and balances.

One company, the Endicott Johnson Shoe Company, has perfected its check on the stores manager in a unique way and at the same time has reduced the clerical work at the store. It has installed in each of its stores a specially constructed cash register. This cash register

has a wide tape. When a salesman has completed a sale, he rings up on the cash register, recording his own number, the shoe stock number, and the amount received. This tape is sent in to the main office at the end of every day together with a brief report on total receipts and total sales. The store takes an inventory twice a year. A record of quantities on hand by stock numbers is sent to the main office at this time. From then on, the store keeps no record of the shoes on hand. The store manager knows what the total pairs on hand should equal, but he cannot tell how many pairs of each stock number he has. The general office, however, has all this information. Starting with the semi-annual physical inventory, the main office has kept an accurate perpetual inventory of the various stock numbers of the stores by adding the pairs shipped to the store, and subtracting the pairs sold as shown on the tape. The main office compares the total balances of its stock number accounts with the balance on hand shown by the store manager's daily report. If there is a discrepancy the store must change its records to conform to those of the main office. When inventories are taken, the shoes in the store must agree very nearly with what the main office records show should be in the store. Stores have been known to be as little as one pair of shoes off in six months of business.

Some chain stores use the tag system.¹ Every box of shoes has a tag attached to it; the tag shows the stock number, size, width, and price. This tag is torn off at the time of the sale. It is used as a memo for entry to the Perpetual inventory records. The girl who wraps the shoes must see that no pair is wrapped unless a tag and a sales slip has been sent in with the shoes. Where it is attempted to

1. For example, The Walkover Shoe Stores.

keep an actual perpetual inventory of sizes and widths of each stock number, this method is commendable. It eliminates most errors that are likely to appear; every pair sold will be certain to be represented by a tag and this tag is not made out by a careless salesman during rush hours. The use of this tag does not, of course, in any way affect the usual form of the records used for the Perpetual Inventory. It merely assures a greater accuracy of the records by substituting printed tags for scribbled sales slips.

As can readily be seen, the quantity Perpetual Inventory has found a very high development in the retail shoe business. The value inventory, on the other hand, has been somewhat neglected. To secure maximum service from the Perpetual Inventory records a combination value and quantity Perpetual Inventory must be used, some such combination as we have described above. Such a system will provide information which will make possible a reduction in stock, - a consideration which is of supreme importance to the shoe retailer, for a reduction in stock means less depreciation in stock, less loss through falling prices, less insurance, less rent, and less interest. It will also discover theft and check carelessness. At the same time, it will make possible a determination of the amount of profit or loss at the end of each month for each department and for the entire establishment, thus putting the executive in a position where he can act more intelligently in directing the business.

Figure 2

STOCK RECORD FOR SHOE RETAILERS

Name	Date	Order No.	Quantity	Date to Deliver	Received	Date	Cost	Selling Price	Keep on Hand		
Kind									Keep on Hand		
Style											
Size											
Size			Size			Size			Size		
Date	Amt. Sold	On Hand	Date	Amt. Sold	On Hand	Date	Amt. Sold	On Hand	Date	Amt. Sold	On Hand

Figure 4

PORTION OF RECORD OF RECEIPTS

Order No.	Date of Order	No. Bairs	Delivery Date	RECEIPTS				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				
				Prs. Rec'd.				
				Prs. Due				
				Date				

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Figures 5

PORTION OF SALES SUMMARY SHEET

Stock Number	Week Ending _____				Week Ending _____				
	Sales		Returns		Sales		Returns		
	Tally	Total	Tally	Total	Tally	Total	Tally	Total	

IV. Lumber Dealers

The use of Perpetual Inventories by lumber dealers is not as common as is their use by most other business concerns. The merchandise which lumber retailers handle is of such a nature that it discourages to a certain extent, the keeping of accurate quantity records. In the first place, each kind of lumber comes in several grades. Each of these grades appears in a great variety of dimensions - different widths, different thicknesses, different lengths. Moreover, when properly piled, lumber can be inventoried by actual count in less time and with less trouble than an accurate perpetual inventory would require. On the other hand, the need of records which can be turned to for definite information at any time is as great in the lumber business as in any other. While most merchandising concerns now have the guidance of monthly operating statements, the lumber retailer who is able to avail himself of this important, almost indispensable adjunct to successful business operation, is the exception rather than the rule.

The usual method employed in retail lumber yards, where any attempt at an accurate knowledge of the conditions of the business is made at all, is that of resorting to an estimated percentage of gross profit to determine the value of the lumber on hand, and of making a frequent count of the stock to determine the quantities on hand. Values are actually seldom computed except at the time of the annual physical inventory; quantities must be known at intervals in order that stock may be properly replenished. The largest Twin City lumber yard has its stock checked every other day. One man does this in a few hours .

He is able to make the count in such a short time because the lumber is piled in units - a crane load to the unit - and because he is familiar with all lumber movements. Much of the lumber does not move at certain times of the year: knowing this, he does not go near the lumber piles which he knows are intact. He does, however, keep card ledger accounts with the more expensive kinds of lumber such as maple flooring. He also adjusts his "count record" for any large receipts of lumber. It must, of course, be seen that his records cannot be accurate at all times for every kind and grade of lumber, but they show what they are intended to show - when and how much to order.

Some lumber dealers, however, have successfully established actual Perpetual Inventory records for all their stock. A practical Perpetual Inventory system, has been devised and used by the Massee and Felton Lumber Company, a large lumber concern in Macon, Georgia.¹ It will serve as an illustration of the better systems in the lumber business.

The man in charge of piling the lumber as it comes in, makes out a Lumber Card upon the completion of each pile of lumber. This Lumber Card contains all the necessary information in connection with one pile of lumber - kind, grade, thickness, length, layers, date, section of yard in which piled, pile number, and content in board feet. The cards are sent to the office at the close of each day. The information is entered in the Stock Book (Figure 7) and the cards stamped to show that they have been entered. The cards go back to the yard and are tacked on the piles which they represent.

The Stock Book is a loose leaf book with pages of heavy paper

1. H.W.Ross, Perpetual Lumber Inventory System, The Wood Worker, April, 1919, pp. 29-30.

which permit of frequent erasure and of rough use out in the open air. All entries are made in the office, but the book is used out in the yard for the purpose of making frequent physical checks upon the accuracy of the Perpetual Inventory. Each kind and grade of wood has a separate page. Reference is made easy by having the book divided up by protruding leather tabs, each division containing the pages for one particular kind of wood. Each page (Figure 7) is divided up into two parts - "Stock" and "Orders". When the lumber cards come into the office, they are grouped by kinds of wood. Then they are entered in the stock columns of their respective pages - section, pile number, number of courses, length, date, and fee being shown.

The lumber is checked out as soon as an order is received for it. Entry is made in the order columns showing order number, date, and feet. Lines are drawn through enough entries in the feet column of the stock division, to cancel an amount of stock equal to the number of feet ordered. Consequently the balance on hand can readily be determined, and no special column is necessary for the balance. It is naturally not usual that an order will be of such a size that it exactly consumes several piles. It is more likely to demand a number of piles and a fraction of another. When part of a pile is sent out, the remainder is called a "butt Pile" and is so marked in the stock book. The "butt pile" is then included in the next order received, so that as few of these piles as possible may be permitted to take up valuable yard space. When a pile has been sent out, the lumber card is sent back to the office. This provides a check on the orders, showing that goods have gone out for them.

A physical check is made monthly. The yard foreman goes through the yard, checking the entries in the stock book, which he has with him, with the lumber cards on the piles. It is a simple matter and

consumes a comparatively short time.

Before this system was used in the Massee and Felton Lumber Yards, physical inventories were also taken every month. Several men were needed to aid the yard foreman in taking the inventory. In addition to causing direct expense, the taking of the inventory interfered with the regular work of the personnel and slowed up the filling of orders. All this was eliminated by the above system. Moreover the stock book calls to the attention of the general office any threatened shortage in any kind or grade of lumber. Whenever an order is received, a glance at the stock book will determine whether or not the order can be filled. The stock book record also provides a history of all recent movements of lumber and aids the buyers in ordering. As regards the value inventory of stock on hand, this can be determined by taking off a list of balances of all accounts in the Stock Book, and pricing the quantities on hand at the prevailing market price. This involves considerable clerical work, but is worth while doing at least quarterly.

We shall consider for a moment the quantity aspect of the Perpetual Inventory only. The Direct Quantity Method is superior to any system of frequent physical check in most cases, for it provides an accurate record of the balances on hand which may be referred to at any time. Moreover, it records the movement of stock and indicates with exactness how long each item has been carried. Under the method of physical check, the balance on hand is definitely known only immediately after the inventory has been taken and no record remains to show how rapid the stock turnover has been for each item in the past, or how various conditions have affected that turnover. There may be cases, however, where the lumber can be so piled that a rough count can be made very quickly. Under such conditions, it may be possible

to have the lumber checked over every day or every other day at a cost so small that it becomes advisable to forego the additional advantages of the Direct Quantity Method Inventory. Especially is this true, since such a system does fulfill to a certain extent the main function of a quantity perpetual inventory - that of showing the quantities on hand at frequent intervals.

Other considerations will apply when a choice is to be made between the two value methods referred to above. It is rarely that a progressive lumber dealer will be content with a quantity inventory only. Whether the first method discussed, the Estimated Mark-up Method, or the second method, a Direct Quantity Method with provisions for pricing the quantities at intervals to secure inventory values, should be used in a particular concern will depend upon a number of circumstances. The Estimated Mark-up Method requires that the gross profit percentage for the period under consideration be correctly determined. If this percentage is in error the inventory will be incorrect. A small error in percentage may make a great error in inventory. Suppose that at the beginning of a period a dealer has a \$70,000.00 inventory and that during the period his sales total \$200,000.00 and his purchases \$150,000.00. He estimates that this mark-up is 20% and accordingly finds that his cost of sales must have been \$160,000.00. His inventory computed from these figures would be \$60,000.00. Suppose that the correct mark-up percentage was 22%; his inventory then actually is \$64,000.00 and he has made an error in inventory of $6 \frac{1}{4}\%$.

Mark-up percentages when estimated are usually based on the experiences of previous years. Percentages so determined may prove nearly correct in many cases; but with conditions in the business world con-

tinually changing as they have been during the last few years, it is not likely that an average or a weighted average or any other estimate will prove correct in a very large majority of cases. The gross profit on a stable market, that on a rising market, and that on a falling market are somewhat different in amount and percentage, and the last few years have shown that changes in price in lumber cannot be definitely prognosticated. In this connection it should also be noticed that a gross profit percentage is often difficult to determine when there is a change in price because wholesale prices and retail prices do not change simultaneously. Because of competition or because of the absence of competition, the purchase and selling price may for a long period be far out of the normal proportion. There may be no tangible relation between gross profits in the past and gross profits in the present. It is, therefore, to be expected that the estimated mark-up percentage determined from the gross profit of previous periods will often be in error.

Under a Direct Quantity Method with a system of pricing quantities at certain intervals, very accurate results can be attained. The quantity records will give exact knowledge of the quantities of each kind of lumber on hand. By applying to these quantities the prevailing market quotations an inventory total which is accurate to within a fraction of one percent can be determined.

This latter method of arriving at the value of the stock on hand is, however, much more expensive than the Estimated Mark-up Method. It requires all the work of a complete physical inventory except the counting of the stock. The greatest work connected with the physical inventory is the pricing of the items, the extension of the amounts and the footing of the columns. A great deal of clerical work is accordingly required when a value inventory is desired by this method,

while under the Estimated Mark-up Method the clerical work consists merely of applying a pre-determined percentage to the sales of each department and then computing the inventory of each department from the gross profit so determined and from the purchases and opening inventory already known.

Neither of these two value methods are accordingly entirely satisfactory: one gives insufficiently accurate results, the other is too expensive. A third method, which is not widely used among retail lumber dealers, has some of the advantages of both systems already considered. This is the Retail Gross Profit Method. This method was thoroughly explained in our discussion of Department Stores.¹

Under this system as we have seen, an accurate inventory at retail value is secured: the only serious error which can be made is in determining the percentage of mark-up. The percentage, however, is ascertained by a comparison of all purchases with the anticipated selling price of those purchases. There is accordingly much less opportunity for inaccuracy than in the case of the Estimated Mark-up Method where no such detailed method of arriving at a percentage is used. In the Department Store, most of the errors are due to the frequency with which mark-downs are taken, and the failure to record all these mark-downs. The lumber retailer deals with a different type of customers and under different circumstances. Mark-downs are less numerous and errors are also fewer. Lumber prices are ordinarily fairly stable, a fact which increases the accuracy of the method. The cost of keeping the Perpetual Inventory by this method is, of course, much less than by the method of pricing the quantities. An entry is made for the retail price of each purchase and a Gross Profit Synopsis is pre-

1. Supra, pp 38-49

pared at the end of the month. All other entries would be made even in the absence of any Perpetual Inventory. The clerical work necessary is, therefore, very small.¹ In the lumber industry, the greatest accuracy at the least cost can be secured by the use of the Retail Gross Profit Method.

A combination of the Retail Gross Profit Method with the Direct Quantity Method will secure all the essential data for the determination of profits or losses by months, as well as the information which is necessary in keeping the stock in proper condition. It will guard against over investment in certain lines and call attention to imminent shortages in some lines. It will present figures which will materially affect plans both in the buying and selling ends of the business.

1. *Supra*, pp 45-47, and *Infra*, p.136

Figure 7

STOCK BOOK FORM LUMBER YARDS

Kind and Grade 4/4 F. A. S. Cyp.

Stock						Orders				
Sec.	Pile No.	No. Courses	Length	Date	Feet	Our No.	Cust. No.	Date	Feet	Remarks
3	447	70	14-16	8-1-18	4200	186	4021	3-1-19	18,000	
	482	70	14-16	8-7-18	4200					
	483	70	14-16	6-5-18	4200					
	491	70	14-16	4-6-18	4200					
	496	70	14-16	3-2-18	3000	Butt				
	498	70	14-16	8-4-18	4200					

CHAPTER V

WHOLESALE MERCANTILE ESTABLISHMENTS

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The methods employed in wholesale merchandising concerns will be studied in connection with several representative businesses--the wholesale grocery and the wholesale dry goods.

I. Wholesale Grocers

The wholesale grocer's problem is a difficult one. The variety of items is so great and the turnover so rapid, that a large force of clerks is necessary to keep an exact and detailed inventory of each item, and the cost of keeping this inventory is likely to be greater than its value to the concern. Then again, the fluctuations in price are so frequent and so violent that predetermined percentages of gross profit are likely to be inaccurate. The case of sugar illustrates the point; wholesale prices of sugar change daily, often by considerable amounts.

Because of these difficulties, many wholesale grocery concerns have entirely given up the attempt to prepare monthly operating statements. They are of the opinion that their inventory figures would not be sufficiently accurate unless determined by methods which are too costly. Operating statements are prepared semi-annually only, physical inventories being taken twice a year. In addition to this, an actual count of the stock on hand is made every week or ten days to

determine what needs to be ordered. Such a count of stock is customary in all wholesale grocery concerns regardless of the perpetual inventory method used.

The wholesale grocers who at least make an attempt to determine monthly their merchandise inventories, may be grouped in three classes; -those who approximate the inventory, either for the business as a whole or for each department, by the use of some more or less accurate percentage of gross profit or mark-up, those who determine the actual inventory in each department by recording the cost of each sale, and those who compute the actual balance on hand for every commodity by recording all purchases and issues as debits and credits to item accounts.

Of those who use the percentage of mark-up or gross profit method, many do not arrive at their percentage by means which are scientific and accurate. They keep a record from year to year of the percentage of gross profit which is made for the business as a whole, or for each department. From this record and from a consideration of the general business situation, they determine upon percentages which they assume to be approximately correct. Accordingly at the end of the month, they multiply their monthly sales by this percentage, and deduct the result from net sales to ascertain the cost of sales. In this way, they determine the monthly inventories, with more or less accuracy, for each department or, in many cases, only for the business as a whole. Other firms, as for instance Green and DeLaittre Company, Minneapolis wholesale grocers, determine the percentage of gross profit for each department by a study of the difference between the purchase prices and sales prices of goods within the department for the period under review. A department buyer knows what he is paying for his commodities, he knows what margin he is trying to make, and he knows just about how closely

he is succeeding in this endeavor. From this knowledge he can determine, it is believed, a percentage which is very nearly accurate.

The great advantage of the Estimated Mark-up Method in the wholesale grocery business is its very low cost of maintenance. A Twin-City firm doing a business of over two million dollars a year and carrying stock of an average value of a half million dollars finds that the computations required at the end of the month for the purpose of determining the departmental inventories require the time of one man for a comparatively short time and that the cost, though it has never been segregated, is very small indeed, probably less than \$75.00 a year. The method gives practically the same amount of information as the more detailed methods, the only question which arises is in connection with the accuracy of the method. This will vary with the prevailing conditions of business and with the exact procedure followed in arriving at the percentage. Where business conditions are stable, accurate results can be obtained, but where prices are fluctuating considerably, it is difficult to secure satisfactory data. This is especially true where the percentage is determined from the percentages of previous years. Where the buyers estimate the percentage of mark-up, from month to month, better results are obtained since they know approximately how their normal gross profit percentage has been affected by temporary conditions. Even then, it must be remembered, an estimate is only an estimate, and many factors will enter into the situation, the effects of which the buyers cannot know. The wholesale house referred to above seldom finds, when the physical inventory is taken, that any one of its departments is more than five percent off. Results within five percent of the correct amounts are

desirable where it is not possible to arrive at more accurate data, but where the inventory can be more accurately determined by some other method which does not cost too much to maintain, the Estimated Mark-up Method should not be used.

Where the inventory is computed by keeping a record of the cost of each sale, the merchandise is divided into commodity groups or departments. The average wholesale grocer has from twenty to thirty such commodity groups, somewhat similar articles being brought together under such department names as Extracts and Spices, Canned Goods, Sugar, Confectionery, Tobacco, Farinaceous, Coffee, Dried Fruit, Bottled Goods, Preserves, etc.

The company's salesmen call on the trade. Orders are filled in on a salesman's order blank, which later also serves as a shipping order. This order blank has columns among others, for the cost and selling price of each article and for the number of the department from which the article must come. The salesman enters the selling price only. At the general office a clerk enters the cost of each article and the department number. A price book is kept from which the clerk making the cost entries determines the cost price to use. The order is then entered on a Distribution Sheet. Each salesman's orders are entered on his special sheet headed with his name. The Distribution Sheet is a wide sheet with columns for date, name of customer, and total selling price and cost of the entire order. There is also a double column for every department, so that the cost and selling price of the items can be recorded by departments. The clerk runs down the department number column on the order blank and picks out the items in the same department. From the cost and selling price columns he gets

the information for his entries into the proper department columns of the distribution sheet, the amounts for items in the same department being totaled and entered in total.

A summary of the distribution sheets is made on a "Recapitulation of Cost and Sales Sheet" which is similar to, and has the same columns as the distribution sheet. From this recapitulation the total sales and cost of sales for the month are determined.

Sales returns are provided for by using credit memos. The credit memo has columns for department number, cost, and selling price. The information on the credit memos is summarized on distribution sheets and recapitulation sheets as in the case of orders; and the sales returns thus serve to reduce sales and cost of sales in each department as they should.

It will now be seen that the inventory for each department can readily be determined. The purchases for the month are secured from the purchase journal totals, the beginning inventory is either the physical inventory or the perpetual inventory amount determined at the end of the previous month, and the cost of sales is arrived at on the recapitulation sheet.

This Departmental Cost Method of arriving at a value inventory is much more accurate than any Estimated Mark-up Method. Actual figures only enter into the determination of the inventory here; no amount which enters into the computation is an estimate. The opening inventory is a physical inventory either at cost or market, the purchases are added at cost, and the sales are deducted at cost. The result, then, must be an inventory at cost. If a physical inventory is taken at cost, at the end of the period, it will agree except for clerical

errors or thefts, with the perpetual inventory. If the inventory is taken at market, the difference between the physical and the Departmental Cost Method perpetual inventory will equal the change in the market price between the date of purchase and the date of inventory of the goods still on hand. The turnover, however, is so rapid in the wholesale grocery business, that under normal conditions the difference will not be great. The results obtained by this method are, therefore, very accurate.

The scope of the information obtained by this method is almost the same as that obtained by the estimated percentage methods. The method provides the data from which the condition of the business and of each department can be determined at the end of every month; it indicates where the profits are being made, where insufficient returns only are being secured, and where losses are being sustained. In addition to this, it points out at physical inventory time, as the Estimated Mark-up Method does not, what portion of the "cost of sales" is actual purchase price of goods sold- and what portion is a reduction in the value of goods on hand due to market changes.

The cost of maintaining this method is greater than that of the Estimated Mark-up Method, for it necessitates the making of an entry for the cost of every sale in addition to the other entries which are ordinarily made. Then too, the cost of sales columns must be totalled and the totals carried into the various summaries. The cost is not as great as might at first be supposed, however, since the entries for the cost of sales are made at the same time and on the same forms as are the other entries which would necessarily be made for other reasons. No segregation of bookkeeping costs has been made by any of the firms

employing this method, but one Twin-City firm with \$10,000,000.00 annual gross sales estimates that the system, together with the detailed records kept in some departments, costs them annually from \$3,000.00 to \$4,000.00. A perpetual inventory kept by this method alone, without further details, would cost less than \$2,000.00 a year. Considering the accurate results obtained, the cost is low.¹ The Departmental Cost Method is accordingly a very good method for wholesale grocers; it gives very accurate results; it secures all the information usually demanded of a value method, and it does this at a very reasonable cost.

The methods described so far are value methods only. To secure maximum results from the perpetual inventory, some method of determining quantities must be combined with the value methods. Quantities are ascertained either by the use of a detailed quantity perpetual inventory record or by a system of physical check. This system of physical check will be discussed later; for the present we shall consider a third value method - the Direct Value Method - with which is combined the Direct Quantity Method.

A few wholesale grocers have gone further than the Departmental Cost Method and attempted to keep an account with every item of merchandise. A form such as the one illustrated in Figure 8 is used. Upon receipt of a purchase invoice, the quantities, unit price, and amount are entered under Goods Received. Entries are made under Goods Sold from the salesman's order blank. Quantity and sales amount are determined directly from the order; the cost amount must be computed by multiplying.

1. cf. *Infra*, p 86 . See also *Infra* p 96.

the quantity by the average unit cost price which is shown in the average price column under Balance on Hand. The Balance on Hand is determined as to quantity and amount and entered at the end of every month, at the bottom of every page before forwarding, and at such other intervals as may be desired. In order that the cost amount of sales and the amount of balance on hand may be correctly computed, the average price must be accurately determined. That is done as follows:

When the first shipment of some item is received, its unit price is entered as the average price. No change is made in the average price until a purchase invoice showing a new unit price comes through. When this happens, the balance on hand quantity and amount are added respectively to the quantity and amount shown on the purchase invoice, and the total amount is divided by the total quantity thus establishing a new average price. The average price is changed in this way every time a shipment is received, the unit price of which is not the same as the previous average price. Sales are always credited to the particular item's Stock Account at the average unit price times the Quantity Sold.

In determining the monthly inventory a list is made of the balances of all the stock ledger accounts. In some cases the Distribution and Recapitulation Sheets described in the previous method are used in this connection with the system, entries being made in the stock ledger and on the Distribution Sheet simultaneously. In that case, the Operating Statement Inventory is readily obtained from the recapitulation sheets and a list of stock ledger balances need not be made every month. The two figures should, however, be checked against each other frequently.

This perpetual inventory system is a combination of the Direct Value Method and the Direct Quantity Method. As regards the value inventory, the method gives very accurate results. The inventory is in general as accurate as the Departmental Cost Method, but it should be observed that it is an inventory neither at cost nor market. Due to the method of issuing stock at the average cost, the inventory values will not be the exact cost of the articles on hand: they will vary from that amount as they are affected by the differences between cost and issue price of articles sold at an earlier date. The method, on the other hand, provides more information than either of the other methods, since it gives a value inventory for each item and makes necessary the keeping of records which will present data on all items purchased and sold in great detail. The stock ledger becomes a history of each item handled by the concern; it is replete with valuable information which will aid in determining both buying and selling policies.

This method, however, has one serious drawback and that is its cost of maintenance. A great deal of clerical work is required to keep the stock ledgers. Entries must be made and balances computed for thousands of accounts, where under the Departmental Cost System increases and reductions of stock affected from thirty to fifty commodity groups only. Low-salaried clerks, moreover, cannot be assigned to the work. Each item comes packed in a different form and in different quantities. Ignorance of these matters is likely to lead to numerous errors and destroy the value of the perpetual inventory record. It is therefore necessary to have the work done by experienced grocery

men, and the cost of the system is likely to be very high. A prominent Northwest Wholesale Grocery Firm, whose annual gross sales range from \$7,000,000.00 to \$11,000,000.00 and whose average stock on hand at cost valuation is slightly over \$1,500,000.00, kept a combination Direct Value and Direct Quantity Method perpetual inventory for a number of years. It was necessary to use twelve men on the stock ledgers during busy seasons and nine during the slack season. The cost of keeping the inventory ranged from \$12,000.00 to \$15,000.00 a year.

It is necessary to note that when this method is maintained a quantity inventory is secured at the same time, for it is a necessary part of the system. In spite of this added attraction, however, most of the wholesalers who have tried this method have abandoned it because of the cost. The firm referred to above discontinued the keeping of a perpetual inventory by the detailed method in most of its departments at the time the business depression became particularly marked, early in 1921. Since then the Departmental Cost system has been used throughout the business while a detailed perpetual inventory has been kept with the items in a few departments and with supplies only. The result has been a reduction in cost of about 65%; if the Departmental Cost Method were used exclusively, the cost would be reduced a great deal more. Other firms have had the same experience. Among those who may be mentioned as having abandoned the Direct Method for the Departmental Cost Method are E. B. Crabtree Company of Minneapolis and Griggs Cooper and Company of St. Paul.

The Departmental Cost Method, as has been shown, is the most suitable method for the wholesale grocery business; it gives all the more important items of information which are usually desired, and it does so with great accuracy and at a very moderate cost. As to the method by which a quantity inventory should be secured, two alternatives present themselves. Either a Direct Quantity Method should be used in combination with the Departmental Cost Method, or a system of frequent physical count should be instituted.

Practically all wholesale grocers make a count of their entire stock every week or ten days.¹ This is done particularly to aid the buyers and, in case an actual quantity perpetual inventory record of all items is kept, forms a valuable check on the balance shown by the record. This count is not made as carefully as is the semi-annual physical inventory, nor are the articles priced. It is pricing and extending that absorb most of the time when physical inventories are taken; a count can be made very rapidly. In some firms one man does all the checking of stock and does but little else; in others several men spend a day a week checking stock. The results are entered in Department Stock Record Books, a page of which is illustrated in Figure 9. Each department manager or buyer, has his own Stock Record Book to which he refers and from it determines what to order. When he has made out his order, he enters above the last balance on hand the quantity ordered that he may be able to tell at a glance how much he can expect within a few days or hours.

This weekly physical count of stock on hand can be made to take

1. The form shown in Figure 9 is used for this record.

the place of the Direct Quantity Method, for it provides the buyers with the more important information secured by that method and with information that is almost equally accurate. A weekly count in a wholesale grocery concern requires much less clerical work than a record kept by a Direct Quantity Method: much of the stock is piled in large quantities in the warehouses and is easily checked. A detailed quantity perpetual inventory requires many entries in the wholesale grocery business, because the turnover is very rapid. In view of these considerations, it is advisable to combine a system of physical counts of quantities with the Departmental Cost Method, and to dispense with a detailed quantity perpetual inventory altogether. Thus both a knowledge of inventory values and inventory quantities is secured at frequent intervals and at a cost which is comparatively low.

Figure 8

STOCK LEDGER

Article

Brand

Department

Size

Minimum

Unit Value

Location

Maximum

Goods Received						Goods Sold					Balance on Hand		
Date Rec.	From	Date Inv.	Quantity	Price	Amount	Date	No.	Quantity	Cost	Sales	Quantity	Av. Price	Amount

ii. Wholesale Dry Goods Dealers.

The problem of the wholesale dealer in dry goods is somewhat less difficult than that of the wholesale grocer. His merchandise does not fluctuate so rapidly in price nor does he have such a rapid turnover. On the other hand, he must carry a tremendous number of different items: several Twin City wholesalers have from 20,000 to 30,000 different kinds and styles of articles on hand. Moreover, most large wholesale dealers in dry goods have jewelry, kitchen utensils, chinaware, and crockery departments. In all, there are usually from fifteen to forty different departments. Most wholesale dry goods houses do use some method of determining with more or less accuracy the value of the goods on hand in each department at the end of every month. In addition to this dollar and cents inventory, each department keeps some kind of a record of the quantities on hand in order that the buyer may be able to determine readily what and when to order.

There are two more or less common methods used of determining the value inventory at the end of the month, each having its own particular advantages and disadvantages.

As an example of the first of these methods may be taken the system used in a large wholesale concern whose main offices are in New York City. Under this method a Cost Record Book is kept in each department and each department has its own special bookkeeper. In the Cost Record Book are recorded the cost of all purchases and the

price at which they are to be sold. It is usual to add transportation charges and deduct discounts taken in arriving at the net cost. Provision is made for adjustment of selling prices where mark-downs are made. The difference between the selling price of purchases and the cost of purchases is now divided by the selling price, the resulting percentage being the percentage of gross profit. A record of sales is kept in the usual way; and to determine the cost of sales, the percentage of gross profit is applied to the sales. The result is the approximate gross profit, which is deducted from the net sales leaving the cost. Once a year, in some concerns twice a year, a physical inventory is taken. To this then is added the first month's purchases and from it is subtracted the cost of the first month's sales. The balance is the inventory at the end of the first month.

In some respects this method resembles that of the retail department stores. The department store's retail method is, however, based on retail values while this method has as its basis cost values. The department store applies its percentage of mark-up to the retail inventory; the wholesale house applies it to sales. The method is in part a Retail Method and in part an Estimated Mark-up Method.

The accuracy of the results arrived at by this method differ somewhat under various circumstances and in different departments. The only point at which errors are likely to enter the computations, is in the determination of the gross profit percentage. The inventory is correct only so far as the gross profit percentage is accurate. Errors in gross profit percentage are likely to arise in several ways. In the first place, it should be observed that the percentage is determined from a comparison of the gross profit anticipated on certain purchases with the probable selling price of those purchases. The

percentage to be used to obtain absolutely accurate results would be the percentage which the actual gross profit for the period is to the sales of the period. The reason for using the former percentage is, of course, that ordinarily it approximates the latter, and it is much easier to determine. A mark-up percentage arrived at by the method being discussed, is in error to the extent of the difference between the anticipated gross profit on the purchases for the period and the actual gross profit on the sales for the same period.

Inaccuracies arise also from frequent and great changes in price. Selling prices must often be adjusted gradually even when purchase prices experience extreme changes. Gross profits change accordingly, and percentages which are computed from purchases may be incorrect for sales. If gross profit percentages on various articles in the same department differ considerably, the purchase in a particular month of an unusually large proportion of articles at either the upper or lower gross profit level in that department, would cause the gross profit percentage to be inaccurate.

Further, if a slight error in the computation of a departmental percentage will cause a considerable error when the percentage is applied to the monthly sales, a small mathematical inaccuracy may thus cause a serious discrepancy in the final inventory total.

Despite the possibility of some condition of the business causing the gross profit percentage to be incorrect, the method gives more accurate results than would an ordinary Estimated Mark-up Method. There are cases where a more detailed and more accurate method than this one would cost entirely too much to maintain, and under such conditions the method is the best substitute.

Under the second method of determining monthly value inventories,

more exact results are obtained, but the work involved is also much greater. The method is essentially a Departmental Cost Method. Physical inventories are taken by departments annually or semi-annually. Purchases are entered at cost only, no record of the selling price being necessary. In some concerns the invoice cost is used, in others transportation and buyer's expenses are added to the invoice cost. The purchases are distributed to the various departments. Clerks particularly assigned to that duty, go over all duplicate sales invoices and compute the profit made on each sale. Special price lists or price cards are provided and kept up to date at all times and it is from these that the costs are determined. Where the shipment includes goods from several departments, the profit applicable to each department must be determined separately. The selling price and the gross profit are entered by departments on recapitulation sheets: from this the total sales and gross profits of each department are determined.

In some concerns, the gross profit is marked on the duplicate sales invoice itself and from there transferred to tabulating cards. When these cards have been put through the tabulating machine, a record is secured of the total monthly sales and gross profits. The cost of the sales is determined for each department by deducting from sales, the department gross profit. Of course, it would be possible and even easier to collect the cost of sales directly and not first determine, as above, the gross profit on each sale and then subtract the total gross profit from sales; but this is usually not done because the amount of gross profit is collected for other purposes and a detail of both cost of sales and of gross profit is unnecessary.

At the end of every month the information collected in the purchase journal and on the sales recapitulation sheets is brought together

in the Merchandise Record Book, The columns in this book are headed with the department names or numbers, and for each department the following information is given:

Inventory, January 1

Purchases

Total

Sales less Profit

Inventory, February 1

Ordinarily very accurate results are obtained by this method, some wholesale houses averaging less than 1% discrepancy between Perpetual and physical inventory at the end of the year. If physical inventories were always at cost, there would be no differences except such as arose from bookkeeping errors. Stock is charged in at actual cost and is charged out at actual cost. Where the inventory is at market, however, it will be necessary to make an adjustment. It must be observed that a drop in merchandise values will ordinarily not affect the operating statement of the month in which the drop takes place. This drop will be reflected only in subsequent months when the goods are sold and smaller profits realized or actual losses sustained. In order to get such losses into the proper period, the firm should take a physical inventory at the end of each month in any department where decided drops in market price have been recorded. This physical inventory will then be substituted for the perpetual inventory figures of the department and the loss will be properly reflected.

The perpetual inventory kept by the Departmental Cost Method is accordingly much more accurate than one kept by the first method described. Since stock enters at cost and is issued at cost, there are none of the possibilities of error that exist under the first system.

The only serious discrepancy which is likely to arise is in connection with the spread between cost and market, and that can be overcome by taking physical inventories of the items seriously affected by a drop in the market. McDonald Brothers and Company, one of the leading wholesale houses in the Northwest, makes use of a perpetual inventory method which is fundamentally the same as the Departmental Cost Method just described. This firm, which does three million dollars of business a year, finds that its perpetual inventories for each department at the end of the year seldom differ more than two percent from the physical inventories in any department, and in many cases the difference in a department is less than one percent.

The cost of maintenance of the Departmental Cost Method is somewhat greater than that of the combined Retail and Estimated Mark-up Method. Under the latter method only purchases and their anticipated selling price are entered; while under the Departmental Cost Method, sales and the cost of each sale are entered. Since sales are much more numerous and much smaller in amount than purchases, the clerical work connected with the more accurate method is somewhat greater. In a wholesale dry goods house, however, most sales are of such a size that it is well worth while to use the Departmental Cost Method. The cost of making each entry in a wholesale house is but a very small portion of the gross profit on the merchandise with reference to which the entry is made. The annual cost to McDonald Brothers and Company of keeping the perpetual inventory by the Departmental Cost Method just described is about \$2,000.00. This firm does about \$3,000,000.00 of business a year.¹ The results obtained are worth much more to the firm than this cost. For the average wholesale dry goods dealer, the Depart-

1. Cf. *Supra*, pp. 91-94.

mental Cost Method is the best value method; it gives very accurate information at a cost which is not too great for the nature of the business.

The value inventory is kept primarily for the purpose of making out an accurate monthly operating statement. It shows the value of the goods on hand in each department, but it gives nothing definite as to quantities on hand of different commodities. The buyer must be informed as to the stock on hand that he may know when and how much to order. Moreover, the salesmen must be kept posted on available merchandise. To sell customers goods which cannot be delivered is poor business. It disappoints the customer and shakes his confidence in the concern. A majority of lines are staples and can be secured at any time, but there are many specialties - such as novel designs in printed dress goods - which cannot be reordered. The two methods of determining merchandise on hand used by wholesale grocers are with some slight modification employed by wholesale dry goods houses. Either an actual count is made of all goods on hand every week or ten days, or a stock ledger is kept where goods are checked in and out as they are received, and as they are shipped.

In wholesale concerns which deal in a great variety of commodities many of which are inexpensive, it is much easier and much cheaper to have the stock counted every ten days than to keep an actual perpetual inventory record of some 30,000 different items. Most of the merchandise is in the warehouses packed or piled in large units and can easily be counted. Each department manager should have his own stock record book (See Figure 9) which he should study carefully to determine what to order. When he places an order, he should enter the quantity ordered next to the count, so that it can readily be referred to when

necessary.

In a concern which deals in commodities which have a greater average unit value, and accurate perpetual inventory record is preferable. Each department has its stock ledger in which is kept an account with each item sold by the department. Often merely a rough record is kept, without much attempt at absolute accuracy. The buyer feels that if he knows within five or ten percent what he has on hand, he can properly gauge his purchasing. The following simple form is used by a Minnesota firm of wholesale dealers in furniture and illustrates the kind of records very frequently used for larger articles.

Chairs - Style H 3						
Kind	1/1/21		2/1/21		3/1/21	
#1032	216		205		193	
#1033	37		31		45	
#1037	.					
#1041						
#1042						

Every other column is used for balances and receipts; the remaining columns are for sales. The receipts are encircled to distinguish them from the balances. The sales are tallied to facilitate their entry.

Other wholesalers keep more careful and complete perpetual inventory records, a form identical with the one used by wholesale grocers (Figure 8) being employed. Most of them omit the value columns, however, and keep a record by quantities only. They consider the value inventory determined by one of the above methods¹ to be sufficiently accurate for the purpose of making up the monthly Operating Statement, while the

1. Supra, p. 91 and p. 94

quantity inventory becomes a guide to the buyers.

CHAPTER VI

FACTORIES

CHAPTER VI.

FACTORIES

Accountants have devoted much thought and energy during the last two decades to the development of perpetual inventory systems for manufacturing establishments, because the use of factory cost systems necessitates the employment of adequate perpetual inventory records. A great deal has accordingly been written on the subject of perpetual inventories in factories. Prominent cost accountants such as Church¹ and Woods² have discussed the subject at length in their books on the determination of factory costs. It would seem at first thought unnecessary to dwell at any great length on the perpetual inventory in factories, for no improvement on the systems set forth by these and other cost experts is here contemplated. On the other hand, the attention bestowed on the factory inventory, has brought about a much greater development than has been the case with the inventories of retail and wholesale businesses. A clear understanding of the possibilities of the perpetual inventory in merchandising concerns requires, therefore, a knowledge of the methods more usually employed in factories. The combination of the Direct Value and Direct Quantity Methods is also seen in its highest development in the factory, and moreover, solutions to

1. A. Hamilton Church, Manufacturing Costs and Accounts.
2. Clinton E. Woods, Unified Accounting Methods for Industrials.

problems which have been worked out in factories will in time be applied in modified form in various retail and wholesale establishments. The more important phases of the factory inventory systems will accordingly be discussed here.

While the perpetual inventory is most fully developed in the factory, it is also most complicated due mainly to several fundamental differences in the conditions of trading and of manufacturing. In general the following considerations are likely to cause the perpetual inventory systems of factories to differ to a certain extent from those of merchandising concerns:

1. In factories a record must be available showing the value of work in process. Raw material enters the factory. Work is begun on this material. It may be in process of manufacture for weeks and months. With the expenditure of labor and overhead it increases in value. A perpetual record of this value must be kept.

2. The same article may show up in a different form in the inventories at different periods. For instance, a piece of steel may be included in the Raw Material inventory today, in the Work in Process inventory tomorrow, and in the Finished Goods inventory later. If inventories are to be kept of the goods in each manufacturing separately, a further complication arises. Materials progress through the factory from process to process, continually accumulating new increments of labor and overhead, and continuously growing in value.

3. The accurate record of orders and of reservations becomes of greater importance in a factory. Production orders cannot be started through the factory unless it is known that all necessary materials and parts will be on hand at the proper time. Orders will indicate when stocks will be replenished, while reservations will show what is going

to be absorbed by other orders. Not only must the quantities on hand be known, but the quantities available at a future date must be ascertainable.

It may be well at this point to note the passage of materials through the factory and their connection with the records. Upon the issue of a contract order, the purchasing agent orders the materials required, unless they are already in stock in sufficient quantities. The order is recorded, and when the material is received, it is reserved for the particular contract order. The receipt of the material is also recorded and shows up in the inventory of Raw Materials. Eventually a production order is issued to the factory covering all or part of the contract order. Materials are requisitioned out for this production order. Now the materials will be found in the inventory of Work in Process. To the cost of materials is added the labor and overhead costs due to the manufacturing operations. These costs are held in the inventory of Work in Process by the requisitions and time tickets until the completion of the production order, when Work in Process is credited and Finished Goods or Finished Parts is debited. From then on the materials with the added costs appear as a part of Finished Goods.

"By this relationship between orders, general stores, requisitions, and time tickets, protected by a proper system of names and numbers a perpetual inventory in all stages of conversion between the purchase of the material and its transformation into something else is made possible. In this way, all material, labor, and expense used in a factory are actually converted into tangible assets at the end of each and every month." ¹

It is usual for a factory to have hundreds and even thousands of

1. Clinton E. Woods, Unified Accounting Methods for Industrials, 1917, p. 71.

different kinds of stores. These include consumable raw materials which enter into the product only indirectly. The Finished Goods of a factory may also consist of a great number of different kinds of articles. Just in what detail a perpetual inventory should be kept, depends, entirely upon the conditions in the particular factory under consideration. In a small factory requiring but a few raw materials and supplies, it is possible that all that is necessary in the way of a perpetual inventory record is a Raw Material or a Stores Account in the General Ledger for the stores.¹ This account is debited with the cost of stores purchased from the totals of the Voucher Journal and credited with the cost of stores used from the totals of the Stores Issues Journal. Where more detail is desirable, several Stores Accounts may be kept in the General Ledger. An account is set up for each of the more important classes of items and a Miscellaneous Stores Account represents all the less important ones. Accidental columns are in some cases introduced into the Voucher Journal and the Stores Issues Journal so that these accounts need be debited and credited only with the monthly totals of purchases and issues. The result is a Departmental Cost Method value inventory.

Such a method provides information on the value of the balance on hand of each of the important groups of materials. It calls attention in a general way to over investment in any particular class of articles and gives the necessary data for the preparation of monthly operating statements. The cost of maintaining such a system is small, for postings to the accounts and the computation of balances is done only once monthly and the accounts are few. The method, however, is advisable only in small

1. A. Hamilton Church, Manufacturing Costs and Accounts, 1917, p.159.

factories and in factories where no cost system is used. Where a cost system which is at all adequate is being used, each item of stores must be priced into the Work-in-Process at an amount which will correctly reflect the cost of that material. This requires the keeping of records which will show the unit cost of the quantity on hand of each separate item of stores at any time. A factory of any size, moreover, must know definitely what quantities are on hand at all times. If records are to be kept of quantities on hand and also of unit costs, of such quantities, it is a comparatively small matter to increase the scope of the records to include the value of the quantity balances for every item. The additional cost is small and the advantages gained are considerable. The Departmental Cost System is accordingly not used a great deal in factories.

The most efficient method is the keeping of a Stores Control Account in the General Ledger and a card ledger account with each different kind of stores, the total of the balances of all the various Stores Item Accounts equaling the balance in the Stores Control account. The Stores Control account then, is a part of the accounting system proper. The Stores Item Accounts are explanatory of the Stores Control Account.¹ This is the Direct Value Method and to it is linked the Direct Quantity Method. Where desirable, Stores Item accounts may be kept with most of the different kinds of stores, while the less important items of stores are kept together in a general stores account. However, in a fully developed system, every kind of stores will be represented by a Stores Item Ledger Card. This card may carry all information of which a record is desired for each class of stores - its specifications, location, symbol number. In the modern factory perpetual inventory system the Stores Item Card usually

1. J. Lee Nicholson, Cost Accounting Theory and Practice, 1918, p.197
Cf. p. 225. *ibid.*

plays the leading role.

Four transactions particularly affect materials in the manufacturing concern. The materials are ordered, they are received, they are reserved for some special future use, and they are issued to the workmen who are in charge of the manufacturing processes. Provision is made for the recording of all such transactions in connection with each item of material on the Stores Item Cards.

When the balance on hand of a certain kind of material runs low, the Stores Keeper forwards a requisition for purchase to the Purchasing Agent. The requisition is O.K'd, a purchase order is made out, and the material sent for. Entry is made in one of the divisions of the Stores Item Ledger Cards - the one to the left - which shows in three separate columns the date the goods are ordered, the purchase order number, and the quantity ordered. Where orders are ordinarily received in installments, it is convenient to have a number of "quantity" or "on order" columns (Figures 13).¹ Then when the order is sent out the quantity ordered is entered in the left hand column. When a shipment is received, this amount is checked off. If the shipment covers the entire order, no further entry in the order division of the card is necessary. However, when only part of the order is received, as would more often be the case, the balance still undelivered is entered in the next column to the right. Later when another shipment is received on the same order, if it does not complete the order, the balance is entered in the next column to the right, and so on. The number of columns used for "On Order" will depend upon the nature of the business and will range from three to seven or eight.

When the material is received a "Material Received Memo" is made

1. A. Hamilton Church, Manufacturing Costs and Accounts, 1917, p.165

out (Figure 10) which gives materials, quantities, purchase order number, etc. This is made out by a receiving clerk: he prepares the memo in quadruplicate. The receiving clerk retains one copy, one goes to the purchasing agent, the third goes to the accounting department and the other goes to the storeskeeper. To the one sent to the accounting department are attached the invoice, the purchase requisition, the purchase order. In the accounting department, the amount of the invoice, if correct, is entered in the Voucher Journal, in which a special column is provided for stores. The total of this column gives the total of stores purchased for the month and gives the control to which we shall refer later.

In some factories the receiving clerk does not check the goods against the invoice and purchase order. He merely makes out a "Material Received Memo". The accounting department checks its copy against the invoice and the purchase order. It may be said in favor of this method that it does away with the necessity of waiting for the invoice in the Receiving Department, if, as is sometimes the case, it has not yet arrived when the goods are received.

In some factories it is usual to make the entry from the "Material Received Memo", direct to the Stores Item Card. In others another step intervenes, a Material Received Book being used. The use of such a book gives an additional check on the accuracy of the Material Received Memos. The total of the amount column must agree with the total of the stores column in the Voucher Journal. Moreover, it is a convenient book for purposes of reference. It contains columns for the date, memo number, order number, name of vendor, quantity, price, and amount. The Stores Item Cards are posted from this receipt book direct. The cards have a division for materials received which usually has columns for the date, purchase order, quantity and amount, as shown in Figure 13. The somewhat compli-

cated matter of pricing will be covered later.

Productive materials should ordinarily be reserved for specific production orders. For this reason a division of the Stores Item Card is devoted to "Reservations".¹ Upon starting a new production order, the planning department can readily determine from this information if the necessary materials will be available for the new order at each stage of production or if other production orders will have consumed the present balance on hand. This division should be read in connection with the division on orders. The balance on hand less reservations may leave but a small portion of the requirements of the new order, but if the amount on order is added to his balance, there may be more than sufficient material to take care of the new production order. This will make the further investment in stock of this particular kind unnecessary. This part of the card is filled out from the "Bill of Material", which is a list of the materials and amounts required to complete a production order. The forms used for this division differ somewhat, but the date, quantity reserved, and production order for which reservation is made are shown in every case.

On a form such as that shown in Figure 13, the quantity reserved is entered in the column furthest to the left of those marked "Unissued". Then if only a part of this total quantity is requisitioned out the first time the remainder still to be issued is entered in the next column to the right; the original quantity is struck out. This procedure is continued until the total quantity reserved has been issued.

Materials are issued by the storeskeeper upon presentation of a "Material Requisition" or a "Bill of Material". At the end of the day these are posted to the Stores Item Cards after they have first been priced. The pricing may be done by the storeskeeper, but in the larger concern a

1. Clinton E. Woods, Unified Accounting Methods for Industrials, 1917, p.69

Pricing Clerk would enter on the different forms, the price to be used for the issues. Just how this price is arrived at will be explained later. The "Issued" division of the Stores Item Card has columns for date, quantity, amount, and sometimes requisition number. This last provision expedites reference to requisitions if any question arises as to the authority for issue or as to quantities. The more usual form appearing on Stores Item Cards is the one shown in Figure 13.

It is often desirable to keep a Material Issued Book. To enter each item separately in such a book would be too great a task and would not give the summarized information desired. The issues are, therefore, grouped by classes or departments, and the total of each of these groups is entered in the Material Issued Book. One of the best methods of handling such a book is probably the one suggested by Church in his "Manufacturing Costs and Accounts". The form (See Figure 12) provides columns for date of issue, total value of issues, and value of issues by each department. The horizontal totals of department issues must then equal the amount in the "Total Value of Issues" columns and this in turn must equal the total of all the postings to the Stores Item Cards for the day. The Materials Issued Book forms, therefore, a valuable check on the accuracy of the posting of issues.

The main purpose to be attained in all this minute recording of orders, receipts, reservations, and issues is to secure an exact knowledge of the quantities of stores on hand or available at any time desired. For this reason it is necessary that the balance on hand be computed either periodically or after entry of each receipt and each issue. For this purpose a final division is provided on the Stores Item cards, usually at the extreme right, where there are columns for quantities and amounts. Where it is the practice to compute balances only occasionally, there may be

a column for the date.

BALANCE

Date	Quantity	Amount

In some cases where more information is wanted as to the materials available, a number of columns are used showing the amounts on order, in reserve, available, on hand in stock, and the value of the materials in stock.¹ This provides very complete data on all balances on hand, but involves considerable work.

BALANCE

On Order	In Reserve	Available	On Hand in Stock	Value on Hand

The Stores Item Card Accounts, it must be observed, are merely subsidiary accounts which do not enter the direct accounting system. They are represented in the accounting system proper by a Stores Control Account or Material Control Account in the same manner as the Accounts

1. Clinton E. Woods, Unified Accounting Methods for Industrials, 1917, p.78

Receivable Accounts in a large merchandising firm are represented in the general accounts by an Accounts Receivable Control Account. In each of these cases the balances of the individual accounts added together will equal the balance in the control account. The Material Control Account is debited with the monthly total of the materials column in the Voucher Journal: it is credited with the totals of the materials columns in the Manufacturing Journal and in the Burden Journal. If no errors are made, the total charges to Materials Account in the General Ledger will just equal the total charges to the Stores Item Card Accounts, for the amounts entered on the Material Received Memos, from which the item accounts are posted, are identical with the amounts entered in the Voucher Journal, from which the control account is posted. The invoice is the original and indisputable record in each case. Again the total credits to the Materials Account in the General Ledger will just equal the total credits to the Item Accounts. The former is posted from the Materials column of the Manufacturing Journal which receives its entries from the Material Requisitions by way of monthly totals of Cost Sheet charges. The latter are posted directly from the Material Requisitions. Accordingly we have a perfect control in the General Ledger of the numerous subsidiary accounts which represent the materials investment.

The combination of the Direct Value and the Direct Quantity Methods, secures for the manufacturing concern and its executives a mass of detailed information. Some of this information would of necessity have to be secured for the cost system, so that it may be said that the additional information obtained costs little or nothing. In its function as an integral part of the cost system, it aids in the determination of the costs of different articles, parts, or departments and at the same time of the profits on each unit and of each department. In addition it pro-

vides information for the monthly operating statement, prevents overstocking and shortages, eliminates physical inventory shut downs, places a check on theft and carelessness, and aids in the shaping of production policies.¹

Of particular interest to the merchant entrepreneur, who studies the factory perpetual inventory for the purpose of applying some of its more highly developed methods to merchandising conditions, is the manner in which records of orders and of reservations are kept, especially where receipts and issues are by installments. The methods employed by which the various balances are controlled by other accounts and are checked by other records also merit particular consideration. The details of the factory system will fit in with conditions in individual trading concerns and produce efficient results.

The most difficult matter in connection with the keeping of stores records where, as is customary, values as well as physical quantities, are recorded as to receipt, issue, and balance on hand, is the question of pricing. "Pricing out" presents the main difficulties; "pricing in" is comparatively simple. Material accounts are charged with the actual cost of materials received as shown by the invoice, plus freight or express charges. The complications of unit price caused by the addition of freight to the invoice price is sometimes found to be rather troublesome. This difficulty is overcome in some factories, for instance, the Minneapolis Steel Machinery Company, by a Materials Freight Account. A percentage of freight on materials is determined and applied to all material requisitions.

"Pricing out" may be at one of three different prices; actual cost of items issued, average cost of all items on hand, or at cost of last items purchased.

1. Supra, Chapter II. These advantages are discussed at length.

To charge out materials at actual cost of those materials is to be recommended where the articles to be priced out are of considerable value and where they are not issued frequently. This method of determining unit price for issue will always leave the value of the balance on hand equal to the actual cost of the items composing this balance.¹ Where each item is of small value and purchases and issues are frequent, this method is not so good. Issues will be made where some of the articles have one issue price, while other similar articles in the same issue must be given a different unit price. Where the articles issued are of high unit value, the cost of keeping the records in such a way as to make issues at actual cost of issues, does not matter. Various methods have been devised to make it practicable to make issues in this way for articles of low unit value also.

A wire manufacturing firm uses a perpetual inventory form which has three different columns for quantities.² No special columns are provided for receipts or issues. They are respectively added and subtracted from the previous balance in the quantity column. No value column is used either. Each quantity column is headed with a price in dollars and cents: this price shows the unit cost of all quantities entered in that particular column. Issues are then made at the cost of the quantities issued as shown by the column from which the quantity issue is subtracted. This method is satisfactory where prices vary between a few set amounts only. A better and more flexible method³ is that used by a manufacturer of

1. H.B. Twyford, Storing, 1918, p. 129

2. Paul M. Atkins, Material Inventories, Factory, Feb. 15, 1921, pp. 472-474.

3. Ibid.

automobile parts who uses a form which contains the following columns:

Quantity Received	Ck	Unit Price	On Hand	Quantity Issued	Ck

When material is received, it is entered in the proper column with its cost per unit in the "Unit Price" column. On the same line under "ck" is entered a letter which serves to designate that particular Price Group. When another shipment is received a similar entry is made for quantity and if the unit price differs from the previous ones, a different letter is entered under "ck" and the unit price is correctly shown. When issues are made later, the first goods received are issued first and to these is applied their cost price by entering in the second "ck" column the letter which indicates the Unit Price Group from which they are taken.

The "last purchase price" method¹ is convenient in that the determination of the new purchase price is simple and takes no extra time. However, it is inexact. The stores accounts will be credited with amounts which do not at all correspond with the amounts with which they were previously charged. An item account may be charged with a certain amount which represents fifty pieces. Fifty more are received at a much larger

1. Clinton E. Woods, Unified Accounting Methods for Industrials, p.79.

price. The result is that after all the pieces have been issued and the account should be closed, it is found that it has a credit balance of considerable amount. At the end of the month, or year, this account is closed out by charging it and crediting Profit and Loss for the amount of the balance. This amount is really profit realized on materials owned. The opposite may occur: it may be come necessary to close a debit balance into Profit and Loss. This would indicate a loss on materials owned. Its main advantage, in addition to the ease with which the issue price can always be determined is that it causes Work in Process to be charged with the market value of materials entering into the product. It has been argued that costs should reflect the current prices of the cost elements, not prices long since altered by market changes.

Where the average price is used in making issues, the unit price of the first articles purchased, is the price paid for them. No change in unit price occurs until a shipment is received whose price per unit differs from that of the initial purchase. The new unit price is then computed by adding to the value of the balance on hand before the new shipment was received, the cost of the new increment, thus arriving at the total value of the new balance. This is then divided by the total number of articles and the new unit price obtained. This average price is a compromise between actual cost of issues and the last purchase price, and, therefore, partakes of the advantages of both methods without securing either completely. The method necessitates considerable computation in order that the unit of price of each article may be kept up to date at all times. It is usual in a factory of some size to have a Price Clerk who does this work.

The preferable method for a factory is somewhat difficult to determine, since the advantages and disadvantages of each of the methods are rather pronounced. Viewed entirely from the point of view of the perpet-

ual inventory, which for the present is our main consideration, the actual cost issue price is the best, and where that is not feasible the average price should be substituted. The last purchase price method leaves the value perpetual inventories with false balances, which are likely to be misleading.

In any case it is necessary to have a column on each of the Stores Item Cards indicating the Unit Price. The Stores Keeper or the Price Clerk enters the new unit price here after the receipt of each shipment where there has been a change in price from that of the last previous shipment. As long as materials come in at a uniform price no entry is necessary in this column. In a large factory it is usually necessary to have a special price card file with cards for each item. On these the price at which issues shall be made are recorded. These cards are taken care of by a Price Clerk. To him are sent all requisitions for material and he prices them. It is his duty also to keep the price cards up to date.

The next step in installing a perpetual inventory system in a factory is to provide continuous records of the value of the work in process. It is not proposed to go into the details of cost accounting here; only those phases of the subject which materially affect perpetual inventories will be discussed. Furthermore, much of the discussion which dealt minutely with perpetual inventories of materials, will apply in connection with the work in process. For example, the connection between the Material Control Account and the Stores Item Cards, and the relation existing between the Work In Process Account and the Cost Sheets are almost identical. The method followed in pricing out issues of material in a factory are of necessity identical with method used in charging materials to the Work in Process. The material inventory and the work in process inventory merge into each other. The former is gradually but inevitably transformed into

the latter. This in turn becomes finished goods inventory.

It is necessary to understand what the different kinds of cost sheets are and what purpose they fulfill. The Production Order Cost Sheet (Figure 14) collects all charges against a particular order - materials, labor, and overhead.¹ The material charges are determined from the Material Requisitions and Bills of Material previously described. These are turned over to the Cost Clerk after having been completed by the storeskeeper. They have already been priced by the Price Clerk: the system must be such that the Cost Clerk's charges of materials to Work in Process will be at the same prices as the Stores Keeper's credits to Materials on his Item Cards. The labor charges are collected on time slips. The overhead charges are distributed monthly to the various Production Orders according to some arbitrary method previously determined upon. These are usually collected on a second kind of cost sheet, an Overhead Cost Sheet. On this are accumulated all indirect materials, indirect labor, depreciation, rent, supplies, etc. At the close of each month the Overhead Cost Sheets are closed out and the total distributed to the various Production Order Cost Sheets. Therefore, at the end of each month, the Production Order Cost Sheets provide an inventory of all work in process, that is, all materials which have entered into manufacturing together with the labor expended upon them and the overhead chargeable to them. At any other time, an inventory of Work in Process must include the balances of the Overhead Cost Sheets.

Accordingly, the cost clerk, upon receipt of the documents already used by the storeskeeper, enters in the Materials division of the indicated Production Order Cost Sheet the required information as to materials. Where no production order is chargeable, he enters the materials on the

1. A. Hamilton Church, Manufacturing Costs and Accounts, 1917, p.320

proper Overhead Cost Sheet for the month in question. Most of the entries on the former will be from Bills of Material, and on the latter from Standing Orders and Material Requisitions, Entries from time slips will be made in a similar manner in the Labor division of the Production Order Cost Sheets where not chargeable. Other expenses not directly chargeable are also entered on the Overhead Cost Sheets from various documents. Then at the end of the month the cost clerk brings all the overhead on to the Production Order Cost Sheets. Each of these continues to accumulate material and labor charges daily and overhead charges monthly until finally the order is completed. At this point the Cost Sheet differs materially from the Stores Item Account, for it is wiped out by a single credit, while the Stores Cards go on functioning as long as the factory. Work in Process is credited and Finished Goods debited: the Order Cost Sheet has ceased to exist as far as the perpetual inventory is concerned.¹

The cost sheets are not, of course, directly connected with the main accounting system. They are subsidiary accounts the total of whose balances will equal the balance of the control account in the General Ledger. This account is the Work in Process or Manufacturing Account. At the end of each month, the total of materials charged to each order for the month are determined and entered in the column provided. These totals are then listed and added. This sum, which should agree with the total shown in the Materials Issued Book, is then the amount with which the Material Control Account is credited and the Work in Process Account debited. When a production Order is completed, Work in Process is credited with the accumulated cost. Finished Goods are charged. The Work in Process Account balance accordingly equals at any time the total of all balances on the

1. Cf. Keeping a Perpetual Inventory (in a Furniture Factory) Factory, January, 1918, p.138.

cost sheets at the beginning of the month.

The above records in connection with Work-in-Process provide a perpetual inventory of all goods in process of manufacture. They tell the value of these goods and through the cost sheets give an analysis of such values, providing the quantities and values incorporated into each production order. Physical inventories cannot secure accurate results in connection with Work-in-Process - the labor and overhead which has gone into such goods can be roughly estimated only.¹ Carefully kept perpetual inventory records, however, will record the exact amounts of labor and overhead which are a part of the Work-in-Process at any particular time. Such records are, therefore, invaluable in determining the inventories for annual, as well as monthly, operating statements. They make possible, moreover, comparisons of the investment in Work-in-Process from period to period, and thus enable the entrepreneur to avoid tying up too much money in Work-in-Process. Most factories keep a continuous record of Work-in-Process, but some factories go even further and keep a record of the goods in each separate process.²

For Finished Goods, Stores Item Cards much the same as those used in connection with Materials are employed (Figure 15). There are divisions for Received, Reserved, Issued, and Balance. When a Production Order is completed, the goods are forwarded to the warehouse together with a summary of the Production Costs or with a Finished Goods Report. The Finished Stock Clerk enters the quantity and value (as compiled on the cost sheets and reported to him) in the Received division. When the Sales Department wishes to reserve goods for particular sales orders, the Stock Clerk is

1. Robert H. Montgomery, Auditing Theory and Practice, 1919, pp. 92-93.
2. See Automatic Inventory for Hosiery Mill, Textile World Journal, June 7, 1919, pp. 111-113.

notified. He enters the date, sales order, and quantity in the Reserved Division.

When the Sales Department desires to ship a certain order of goods, it sends a shipping order in duplicate to the Stock Clerk. The Stock Clerk turns the goods over to the Shipping Clerk together with one copy of the shipping order. This order is sent with the goods. The stock clerk posts his item cards from the other shipping order and then forwards it to the general office for billing. He enters the date, customer's name, quantity, and cost in the Issued division. Ordinarily the new balance should be computed each time that goods are received into stock from the production departments or sent out on shipping orders. The pricing of both receipts and issues should be at cost as shown by cost sheets upon completion of the production order.

When a production order is completed, the control accounts are affected as well as the item accounts, Work in Process being credited and Finished Goods debited.¹ The next step is the sale of the Finished Goods. This is shown in the accounting system by a credit to Finished Goods and a debit to Cost of Sales, the amount being the cost of manufacture as shown on the item cards. At the same time Sales are credited and Accounts Receivable debited for the selling price of the goods.

The method by which a perpetual inventory is secured of Work-in-Process and of Finished Goods in the factory is fairly well standardized and the methods described are representative of systems employed in most well equipped factories. It is true that there are many variations in the details of administration, variations devised to take care of peculiar situations in particular industries. The combination of the Direct Value

1. J. Lee Nicholson, Cost Accounting Theory and Practice, 1918, p. 198.

and Direct Quantity Methods, however, is adapted to secure an inventory of the stock on hand, no matter what stage the stock may be in - Raw Material, Work-in-Process, or Finished Goods. Such a system does for stock what the cash records do for cash: it shows at all times how much stock is on hand and it leaves a permanent record from which can be determined the transactions which brought about the particular balance. A thousand dollars in stock is as great a proportion of a man's net worth, as is a thousand dollars in cash; and, aside from the fact that it may perhaps be less readily stolen, it should require as much clerical attention. This close check on stock is secured in the factory by the method described. The inventory amounts for the monthly operating statements are thus obtained with greater accuracy,¹ than would be possible even with physical inventories and in addition to that the usual advantages of a complete value and quantity perpetual inventory are secured.²

It should be observed that many of the conditions surrounding the determination of inventories in factories are not far different from those of mercantile establishments. The problem of "pricing out" in a wholesale grocery concern is somewhat the same as that in a factory, goods are received into stock in the department store through channels similar to those through which the factory receives its material, questions of control are much the same in the large retail implement store as in the manufacturing establishment. There is no reason why the wider experience of the factory should not be largely drawn upon in the development of adequate perpetual inventories for mercantile businesses, and the perfecting of such perpetual inventory methods may be greatly hastened by a study of factory systems.

1. Supra, p. 118

2. Supra, Chapter II.

Figure 10

MATERIAL RECEIVED MEMO			
Lawrence Sheet Metal Co.		Date _____	
Duluth, Minn.		Received From _____	
Via _____	Frts. Bill No. _____	Frts. Charges _____	
Account of Order No. _____		Purchase Requis. No. _____	
Quantity	Name of Materials	Size	Remarks
Signed _____			

Figure 12

MATERIALS ISSUED BOOK

Date of Issue	Daily Total Value Issued	Selling Dep't.	Standing Orders						Production Orders						Plant Add'l. Orders					
			Department						Department						Department					
			1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Thur.																				
Fri.																				
Sat.																				
Sun.																				
Mon.																				
Tue.																				
Wed.																				
Total W.E.																				
Thur. etc.																				
Total W.E.																				

Figure 14

PRODUCTION ORDER COST SHEET

Order No.

Department No.

Date Issued

Date Completed

For

							Burden					Grand Total
Date	Man.	Mach.	Hours	Month Total	Wages	Monthly Total		Date	Description	Wt.	Cost	
TOTALS												

Figure 15

FINISHED GOODS RECORD

FINISHED GOODS RECORD											Symbol				
Name and Description					Unit of Measure										
Location: Building No.				Floor No.			Aisle No.			Bin No.					
When Balance on Hand, less Reservations is under:								Notify Works Manager							
Received					Reserved			Issued			Balances				
Date	From	Unfinish-	Total	Qty. on	Date	For	Qty.	Date	To	Qty.	Unit	Reserved	On Hand	On Hand	Value
Date	Order No.	ed Order	Cost	Fin. Orders					Whom		Price		Unfin. Orders	Fin. Goods	on Hand

CHAPTER VII

CHOICE OF METHODS TO FIT INDIVIDUAL BUSINESSES

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We now have before us the information from which we can determine the suitability of the different methods for various types of businesses. The first step necessary in installing a perpetual inventory system in any concern is to make a thorough study of the line of business in which the company is engaged and of the particular business enterprise itself. Each concern has its own peculiar problems and it is essential that these be understood before definite measures are taken. It is necessary to inquire first of all as to the purpose which the entrepreneur desires to accomplish by installing the perpetual inventory system. The degree of accuracy which is required in setting forth the inventory figures will also demand study. Then the nature of the material or merchandise handled will particularly affect the selection of a method. Finally, the comparative cost of the possible inventory methods as applied to the concern in question must be carefully considered.

In our discussion of the advantages of keeping perpetual inventories we pointed out that no one method would bring into the business all the advantages there enumerated, but that each method and each combination of methods had its special advantages. Some business executives do not require the same information as others; each one has certain ends in view in installing a perpetual inventory system. The purpose for which the inventory records are created must always be kept in sight while devising

the system for a particular business. Either the entrepreneur wishes to get accurate monthly statements on the results of his business operations, or he desires to obtain data on each item of stock in detail so that he may plan his production, buying, and sales policies in accordance therewith. Usually he demands both. One must, however, avoid supplying something which is not desired very much, for every bit of extra information collected requires some extra expense.

If a business man wishes only to get early and frequent information on the results of his business, if his particular aim is to have monthly operating statements, then a value method should be used. Which one, will depend upon other factors. The leading Minneapolis jewelry store secures such data by using the Departmental Cost Method, while the Minneapolis Steel and Machinery Company secures accurate results by using the Direct Value Method. Any value method which is properly adapted to the business will collect the information necessary to use in showing the results of business policies for periods of a week, month, or any other length of time.

If the entrepreneur desires knowledge of the rates of turnover, articles on hand, and other detailed information which can be used as a guide to buying and selling, the Direct Quantity Method should be installed. It provides a complete history of each item, shows how many articles have been received, the time which elapsed between date of ordering and date of receipt, the date of the last receipt, the number of articles now in the stock room or store, the number now on order, the number reserved for customers, the number of sales in the last week, in the last month, in the last year, the months or weeks in which sales were heaviest or lightest, and many similar valuable items of information. If the entrepreneur wishes to keep a close check on supplies, fuel or containers in order that he may

never run short of any of the essentials to the continuance of his business, he should keep a Direct Quantity Method perpetual inventory. Such a system, for example, is employed by the Washburn Crosby Flour Mills for flour sacks.

If a reduction to the minimum in stock investment is sought the Direct Quantity Method will give the desired results. It will call attention to the articles which should not be kept in stock at all, and it will indicate where stock reduction is advisable. The Patton Paint Company of Milwaukee was able to reduce its stock from 15 to 20% by the installation of this quantity method.

If the purpose of the perpetual inventory is both to make possible monthly operating statements and to be a buying guide, or a combination of the Direct Quantity Method and one of the value methods should be employed.

If its purpose is to discover the profit made by the different departments each week or month, any value method is practical, but the business must be properly departmentalized.

The accuracy desired will influence the selection of a system. If the entrepreneur finds that approximate results will be as valuable for his particular purpose as very accurate results, an estimated mark-up system should be installed, for it costs less than any other. Where absolute accuracy is required, a combination of the Direct Quantity and Direct Value Methods will be employed. The degree of accuracy desired, as can readily be seen, will also affect the method of pricing issues. Ordinarily, the accuracy necessary will depend upon the purpose for which the perpetual inventory is to be kept.

In the study of the nature of the merchandise or material handled, prices should come in for primary attention. Is the average unit price

high or low? Is there some uniformity between the articles in each department? Are prices rather stable or do they fluctuate violently.

Where the unit price is high, it is worth while to keep a record in detail of all transactions in connection with each kind of goods. It costs no more and it causes no more inconvenience to keep an exact record, by values and by quantities, of diamonds than it does of clothes pins; but in the former case the unit value is so high that the cost of keeping an exact record of diamond transactions is but an infinitesimal part of the gross profit made, while in the latter case the cost of keeping the record may absorb the entire gross profit. In the one case, an exact record can be kept; in the other some indirect value method will be necessary. Moreover, where the price is high, the risk of theft is great. One of the executives of a Twin City department store¹ states that his concern loses through theft thousands of dollars worth of expensive gowns and other articles of wearing apparel annually. This merchandise is stolen mostly by clerks who are able to conceal and to carry away these high priced goods. The use of a quantity inventory by this company has kept the manager informed as to where the thefts were being made and he has been able to discover the culprits or to discourage them by his vigilance, thus keeping losses of this kind within bounds. Losses through carelessness of any kind would also be extremely costly. Consequently, it is necessary to keep a close check on high priced merchandise. A method which requires the recording of any amount of detail in connection with various kinds of merchandise, is practical where the unit price of those articles is high, and impractical where it is low.

Lack of uniformity in price does not affect the suitability of a method unless it also involves a lack of uniformity in gross profit percent-

1. E.E. Atkinson and Company, Minneapolis, Minn.

age. However, it is usual for the percentage to be different on articles of small value from the percentage on articles of high unit value. The hardware retailer can sell furnaces on a much smaller percentage of margin than jack knives, unless the rate of turnover is very unequal. Turnover complicates the situation; for the greater the rate of turnover, the less the gross profit percentage is likely to be.

From this it will be seen that both the differences in rate of turnover and differences in unit price will affect the percentage of gross profit, and thus indirectly the method of perpetual inventory which is to be selected for the business: a business that deals in articles on which the percentages of gross profit that are realized vary greatly, cannot use the Retail Gross Profit Method or an Estimated Mark-up Method for the whole business as a unit. A retail grocery store makes two hundred percent gross profit on some articles; on others it makes no gross profit, selling them merely as an accomodation to its customers. The retail price, and consequently the gross profit, is in many cases set by the producer, so that the grocer has no control over the gross profit percentage. Suppose the Retail Method is used in a retail grocery store. (We shall consider an extreme case which will indicate the tendency.) In a certain period the proportion between the cost and retail value of purchases may show a 35% mark-up. If in this period it happens that articles of a high gross profit percentage are sold almost to the exclusion of all other articles, and that the average percentage of mark-up on actual sales averages 60%, the inventory totals obtained by the Retail Method will not even be approximately correct. The cost of sales will be equally in error and the profit for the period will be much understated. In a clothing store, on the other hand, where the variations in gross profit percentage do not exceed ten percent on but a very small portion of the sales, the discrepancy due

to heavy sales in certain lines will not affect the final inventory total to any serious extent.

Other conditions being favorable, a business in which there is a great variation in gross profit percentage, can secure accurate results from the Retail and the Estimated Mark-up Methods if it is convenient to have the business so departmentalized that in general only articles having somewhat the same percentage of gross profit are grouped together. Very often this is impracticable. Where it is practicable, the department becomes a unit and, of course, any differences in percentage between departments do not matter. Accordingly, great differences in gross profit percentage between articles sold will be unfavorable to the use of the Retail Method or an Estimated Percentage Method unless departmentalizing can be carried out with the aim of securing approximated uniformity of gross profit percentage within the departments.

Fluctuation or stability of price will help to determine the feasibility of the various methods. Violent fluctuations of price in a business will decide against the Retail Method, because its results are likely to be inaccurate. A retail price determined today - as in the case of butter and eggs - may change several times both up and down before the entire stock is sold. A retail price determined for fruits on one day must be changed the next either up or down depending on the season and on many conditions whose effects cannot be predetermined. Additional mark-ups and mark-downs would be so numerous that it would be extremely difficult to record them properly, and could not be done except at too great a cost. Because of the great number of entries, there would also be a greater opportunity for errors to creep in with a consequent inaccuracy in the total inventory amounts. Under such conditions, the Estimated Mark-up Method is to be preferred to the Retail Method, since the difficulty and cost of

keeping the records will not be materially increased on account of the fluctuations in price where the Estimated Mark-up Method is employed, although the comparative accuracy of the two methods will not change.

Under a condition of rapidly fluctuating prices, an inventory secured either by the Direct Value or the Departmental Cost Method is also likely to be somewhat less accurate than under more stable conditions, for the reason that the issue price must be continually altered and as has been pointed out,¹ more errors creep into inventories at the point of pricing issues than at almost any other. If the fluctuations are very frequent and very violent, it may be advisable not to use any perpetual inventory method at all, since the results obtained would be very inaccurate and unreliable. Stability of prices in a business tend to increase the accuracy of any method; while fluctuations of prices materially reduce the accuracy of a perpetual inventory secured by any method, and make the retail method entirely impracticable.

The ease with which physical inventories can be taken in the business also influences the selection of a method. In a business where the turnover is rapid and physical inventories can easily be taken, it may be advisable not to use a quantity perpetual inventory at all. A value method only may be used, and a physical inventory taken every week or month. In some businesses it is comparatively easy to check over the stock on hand. A considerable number of wholesale houses have practically all their stock in big bales in the warehouse. Other businesses have found it possible to arrange their goods in such a way that the taking of the monthly inventory has become a small matter. On the other hand, in a concern which deals in merchandise which is difficult to count and measure, a per-

1. Supra, pp. 111-115.

petual inventory by quantities is essential. Foundries and coal companies offer good illustrations of this. Physical inventories are only a guess with them; while perpetual inventories are very nearly accurate. Other things being equal, ease of taking physical inventories tends to reduce the value of quantity perpetual inventories to the business, and the greater the difficulty of taking physical inventories, the greater the necessity of having a quantity perpetual inventory as part of the system.

The cost of a method or combination of methods may be so great that the results obtained are not sufficient to warrant its use. The cost of installation is probably worth considering, but, in general, it is unimportant as compared with the cost of maintenance. A firm cannot afford to keep a dozen men working on the perpetual inventory records unless it is securing some very evident results from these records. It must also be remembered that it is not the cost of maintaining a certain system that matters. It is the cost as compared with the value of the data obtained.

The Direct Value Method, in a business where transactions are numerous, costs a great deal to maintain. It requires that an entry be made for every purchase and every sale regardless of how small the article may be. Each transaction may require, as illustrated in the case of the factory, additional entries to secure the proper control.¹ Much time is consumed in determining the correct issue price and in locating errors. As previously stated,² where the gross profit on an article is small, the cost of keeping a perpetual inventory record by the Direct Value Method is likely to absorb the greater part of the gross profit. In general, the greater the unit cost of the articles handled, the more likely the Direct

1. Supra, pp. 109-111.

2. Supra, p. 85; also p. 130

Value Method is to be profitable. Where a quantity inventory is also to be kept, the Direct Quantity and the Direct Value Method records can be kept together on the same form and the cost of each reduced. Such a combined record provides a wealth of information on each article and is very valuable: nothing but the cost should prevent any business from keeping such a record. The cost of keeping a quantity record alone, unsupported by the Direct Value Method Inventory, would be considerably less than that of the combined record, since the pricing out of articles involves considerable difficulties. Where orders and reservations are also recorded, the cost as well as the value of the perpetual inventory is correspondingly enhanced. In each individual case the importance of the information made available, must be weighed against the cost of securing it. The business is not being run for the perpetual inventory: the latter is being kept for the sake of the business.

The Departmental Cost Method requires that the issue price of each article be determined and entered. In the merchandising concern this means that the cost of each sale must be ascertained and entered in the Sales Journal. The information is grouped in the Journal into departments and commodity groups: there is no need of posting to individual article accounts, or of determining their balances. Accordingly the clerical labor is much reduced under this method; but it must be observed that the information received is also much reduced. The more detailed method should not be installed until it has been definitely determined that this simpler method is insufficient. Many firms have had the same experience as the E. B. Crabtree Company, Minneapolis wholesalers of tobacco and cigars. This company installed a perpetual inventory system which was a combination of the Direct Quantity and Direct Value Methods. After the system had been in operation for some time, it was abandoned because of the great amount

of clerical work involved, and the Departmental Cost Method substituted. It would have been to the great advantage of the E.B. Crabtree Company to have installed the latter system in the first place.

Under the Retail Gross Profit Method, it is the selling price of purchases which is recorded instead of the cost of sales; and since the purchases usually are in much larger bulk than the sales, less clerical work is necessary to keep the perpetual inventory under this method than under the Departmental Cost Method. The Estimated Mark-up Method requires very little clerical work in addition to that which must be done even in the absence of a perpetual inventory. In every case, a reduction in cost of maintaining the records is accompanied by a reduction in the amount or accuracy of the information obtained.

It must not be supposed, however, that the costs of maintenance by the different methods are in the same ratio to each other in all businesses. The conditions of a certain business will greatly increase the cost of maintaining a certain method, as for instance, in the wholesale grocery business where it is necessary to have experienced grocery men in charge of the stock ledgers.¹ The business customs of the wholesale grocery trade demand that certain items be packed in certain ways and in certain quantities; anyone ignorant of these customs of trade would be likely to make many errors in pricing out. The cost of keeping the perpetual inventory is, of course, much greater where high wages must be paid the clerks because of their special experience and special fitness for the work.

Accordingly, in selecting a system for a business, it is necessary to ascertain the particular purpose for which the system is being installed, and the accuracy which it is desirable to secure. It is necessary to

1. Supra p. 85

consider whether or not the articles handled are of low or high unit price, whether or not they have a somewhat uniform price and rate of turnover, whether they fluctuate or are stable in price, whether physical inventories can or cannot easily be taken. The cost of installation and maintenance of the various methods must also be carefully compared.

In the near future, the perpetual inventory will be adopted in some form by industries which have used no such records in the past. Furthermore, many concerns engaged in industries where several systems of perpetual inventory are in use, but who themselves are at present without any perpetual inventory records, will shortly wish to adopt some method which will give them the best results for the least outlay. To what methods or combinations of methods then, are the concerns in each line of business to look for the type of system which will be suitable for them?

Now that we have discussed the conditions in a business which are favorable to certain methods and which will tend to make them work out successfully, it only remains to point out the businesses which each method is best fitted to serve because of these individual conditions which exist, and to indicate briefly how the characteristics of each method fit into the conditions of these businesses. There are, as we have seen, two distinct kinds of perpetual inventory methods, viz: the quantity and the value methods. Each of these accomplishes a distinct end, and to secure a maximum service from the perpetual inventory, it is ordinarily necessary to have a combination of a value method with a quantity method, one to furnish information in detail on the balances and the movements of each item in which the business deals, and the other to show quickly and accurately the results of policies adopted. This must be borne in mind in any consideration of methods and their suitability.

The Direct Value Method alone is not to be recommended for any indus-

try. The information which it provides for the operating statement can ordinarily be secured by a less costly method. If it should be determined that the Direct Value Method were the best method for a business, the quantity inventory may as well be kept at the same time, as the additional cost would be small.

The Direct Value and Direct Quantity Methods in combination provide for each article a record which is a mine of valuable information. An inventory record, kept by a combination of these methods collects a great deal of valuable detail and it provides inventory totals with great accuracy. This system would be desirable in every concern, if it were not for the great amount of clerical work involved and the consequent high cost of maintenance. This system is especially suitable for firms which deal in merchandise of high unit price. Establishments dealing exclusively in musical instruments and phonographs, or in bicycles, or in furniture and rugs, or in ready made suits and overcoats are best taken care of by a combination of the Direct Value and Direct Quantity Methods unless a considerable proportion of the sales are of small repairs or accessories or other articles of small value. This system may also be used in businesses which handle merchandise almost exclusively in large quantities; for instance wholesalers and jobbers who sell only by the hundredweight and the gross. This system is applicable to most factories, since much of the clerical work ordinarily absorbed by the perpetual inventory records is done in the factory in order to determine the amount of material which should be charged to the different jobs or departments. The pricing of materials going into goods in process and the recording of the value of such materials must be performed in any case. Some record of quantity balances must also be secured for ordering purposes. By consolidating the collection and determination of certain portions of the cost data with

the perpetual inventory records, it is possible to keep a perpetual inventory record in the factory by the combined Direct Quantity and Direct Value Methods without undue additional cost. This system then is applicable particularly to industries dealing to a large extent in articles of high unit value, industries dealing only in large quantities, and to most factories .

The Departmental Cost Method used alone provides data for the monthly operating statement and for the determination of departmental profits. Where the perpetual inventory is established for no other purpose, this method is worthy of serious consideration. It may also be used alone where the merchandise is of such a nature that it is easy to take physical inventories. Ordinarily, however, it will be used in combination with the Direct Quantity Methods.

A combination of the Departmental Cost and the Direct Quantity Methods is particularly suitable to a business where the majority of articles handled are of medium unit value. If the unit price were high, the Direct Value Method would no doubt be better; if the unit price were very low, considering the cost of maintenance, one of the other methods would be preferable. Where a proper scheme of pricing out issues is evolved, this method is very accurate--more so than the Retail Method or the Estimated Mark-up Method. With articles of medium unit price, the somewhat higher cost of maintaining this method is well worth while. In industries where each sale is of at least a medium large quantity, this method is also suitable, while it is not where the sales are in small quantities. Accordingly, this system is particularly to be recommended for shoe stores, men's hat shops, sporting goods shops, jewelry stores, leather goods shops, wholesale dry goods concerns and other similar establishments.

In a few cases where unit prices are rather low, it becomes desirable to use this system, nevertheless; for instance, in businesses where conditions are such that the prices fluctuate violently, or where the desired

method of departmentalizing groups together articles of very unequal gross profit percentages. In neither case can the Retail Method be used. If considerable accuracy is desired, the Departmental or Commodity Cost Method is in any case preferable, of course, except for the considerable increased clerical work. The method is therefore suitable for wholesale grocers, creameries, and wholesale fruit dealers. It cannot be recommended for retail grocers or fruit dealers because the size of each individual sale is small.

As already stated, the Departmental Cost Method should be used alone where physical inventories can be readily taken, or where the purpose of the perpetual inventory is merely to secure data for the business and departmental operating statements. In some businesses the merchandise can be arranged so that it can readily be checked. The wholesale grocery business and wholesale fruit business are in this category, and in many firms, depending upon the particular circumstances, it is well to install only the value system and leave the information on quantities to physical counts.

The Retail Gross Profit Method should seldom be used alone in all the departments of an establishment. It should be used in combination with the Direct Quantity Method in as many departments as possible. In some establishments the Direct Quantity Method will be used in all the departments, in others it will not be used in some departments because of the low unit value of the articles in that department or because of the ease of taking physical inventories.

The Retail Gross Profit Method, combined in some departments with the Direct Quantity Method, should be installed in businesses which handle many articles of low unit value. The fact that the business also handles articles of high unit price does not alter the case. The cost of this method is much less than that of the Direct Value or Departmental Cost Methods; yet

it is fairly accurate. It should be installed only in businesses in which prices are fairly stable, and in which the departments do not include articles which differ greatly in percentage of gross profit. The use of the Retail Method should be much increased in department stores and large hardware stores, and it should be extended into new fields. It would provide the most information at the least cost for lumber dealers, men's clothing stores, tea, coffee and spice dealers, large drug stores, and other business concerns of a similar nature.

The Estimated Mark-up Method is not always very accurate, but it gives some valuable results while involving but little clerical work. Since it is less accurate, it should not be used unless all other methods are impractical. Where the merchandise is of small unit price, the turnover rapid, and prices subject to frequent fluctuation, the Estimated Mark-up Method should be used. Other methods would be too costly, or would give no more accurate results at much greater cost. Under stable prices the Retail Method can usually be used, but in some cases purchases for one reason or another are in such small quantities that the cost of recording becomes too great even for the Retail Method. The Estimated Mark-up Method should then be made use of. In general, this method should only be employed by retail grocers, retail meat dealers, fruit store operators, confectioners, and similar dealers.

The Estimated Mark-up Method should seldom, if ever, be used in conjunction with the Direct Quantity Method; if the merchandise is valuable enough to warrant the keeping of an exact quantity inventory, some more accurate method than the Estimated Mark-up Method should be installed to record values.

There may be occasions where the Direct Quantity Method will be used alone. The purpose of the entrepreneur may be only to secure information

to guide him in certain details of buying or of selling. In such cases some form of the Direct Quantity Method should be used--unless the unit price is very low and the turnover rapid. Under circumstances of this nature, it may be necessary to remain content with frequent physical inventories. Even where the unit price is only moderately low, the ease of taking physical inventories should be considered together with the sufficiency of the information so secured. Ordinarily, however, the Direct Quantity Method will give the maximum satisfaction where the purpose to be accomplished is limited as stated.

In view of the great advantages to be secured by the use of perpetual inventories, advantages which accrue both to the individual entrepreneur and society as a whole, it is of the greatest importance that business executives everywhere be made cognizant of these advantages and of the methods whereby they can be attained. Many firms suffered severe losses during the post-war period of deflation because of too heavy investment in materials and merchandise, and were shocked into a realization of the need of perpetual inventories. A minority of businesses, however, have developed efficient methods for themselves; and in most of these businesses many individual concerns either use no perpetual inventory system at all or employ methods which are not suitable or efficient for their particular enterprise. As the conditions of competition in industry become more severe, business men will be aroused more and more to a realization of the importance of perpetual inventory records, and will endeavor to ascertain the methods which for them will be most economical and efficient. It will be found that the methods here outlined will be the most suitable for the businesses indicated: as for the details, it will be necessary to work these out to fit the circumstances of each individual concern. There is scarcely a business, which some method of perpetual inventory is not

able to serve effectively, and the next few years of normal business activity will make this increasingly clear.

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