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Chapter 4

The Management of Working Capital

4.1 MANAGING NET WORKING CAPITAL

Working capital is equal to current assets. *Net* working capital is equal to current assets less current liabilities.

EXAMPLE 4.1 Ace Company has the following selected assets and liabilities:

Cash:	$10,000
Accounts receivable:	$30,000
Inventory:	$42,000
Machinery:	$90,000
Long-term investments:	$36,000
Patent:	$4,000
Accounts payable:	$12,000
Taxes payable:	$3,000
Accrued expenses payable:	$5,000
Bonds payable:	$50,000
Common stock:	$70,000

The net working capital is:

CURRENT ASSETS		
Cash	$10,000	
Accounts receivable	30,000	
Inventory	42,000	$82,000
CURRENT LIABILITIES		
Accounts payable	$12,000	
Taxes payable	3,000	
Accrued expenses payable	5,000	20,000
Net working capital		$62,000

Management of net working capital involves regulating the various types of current assets and current liabilities. Management of net working capital also requires decisions about how current assets should be financed, for example, through short-term debt, long-term debt, or equity. Net working capital is increased when current assets are financed through noncurrent sources.

The liquidity of current assets will affect the terms and availability of short-term credit. The greater the liquidity, the easier it becomes, generally, to obtain a short-term loan at favorable terms. Short-term credit, in turn, affects the amount of cash balance held by a firm.

Working Capital Management and Risk-Return Trade-Off

The management of net working capital requires consideration for the trade-off between return and risk. Holding more current than fixed assets means a reduced liquidity risk. It also means greater flexibility, since current assets may be modified easily as sales volume changes. However, the rate of return will be less with current assets than with fixed assets. Fixed assets typically earn a greater return than current assets. Long-term financing has less liquidity risk associated with it than short-term debt, but it also carries a higher cost.

For example, when a company needs funds to purchase seasonal or cyclical inventory, it uses short-term, not long-term financing. The short-term debt gives the firm flexibility to meet its seasonal needs within its ability to repay the loan. On the other hand, the company's permanent assets should be financed with long-term debt. Because the assets last longer, the financing can be spread over a longer time. Financing assets with liabilities of similar maturity is called *hedging*.

4.2 CURRENT ASSETS

By optimally managing cash, receivables, and inventory, a company can maximize its rate of return and minimize its liquidity and business risk. The financial manager should determine the amount to be invested in a given current asset. The amount invested may vary from day to day and require close evaluation of the account balances. Current assets are improperly managed if funds tied up in an asset could be used more productively elsewhere. Financing such assets with debt incurs unnecessary interest expense. Also, large account balances indicate risk since, for example, inventory may not be saleable and/or accounts receivable may not be collectible. On the other hand, inadequate current asset levels may be costly as, for example, when business is lost because lack of inventory does not permit the timely fulfillment of customer orders.

4.3 CASH MANAGEMENT

Cash refers to currency and demand deposits. *Cash management* involves having the optimum, neither excessive nor deficient, amount of cash on hand at the right time. Proper cash management requires that the company know how much cash it needs, as well as how much it has and where that cash is at all times. This is especially essential in an inflationary environment.

The objective of cash management is to invest excess cash for a return while retaining sufficient liquidity to satisfy future needs. The financial manager must plan when to have excess funds available for investment and when money needs to be borrowed.

The amount of cash to be held depends upon the following factors:

1. Cash management policies
2. Current liquidity position
3. Management's liquidity risk preferences
4. Schedule of debt maturity
5. The firm's ability to borrow
6. Forecasted short- and long-term cash flow
7. The probabilities of different cash flows under varying circumstances

The company should not have an excessive cash balance since no return is being earned upon it. The least amount of cash a firm should hold is the greater of (1) compensating balances (a deposit held by a bank to compensate it for providing services) or (2) precautionary balances (money held for emergency purposes) plus transaction balances (money needed to cover checks outstanding).

Cash management also requires knowing the amount of funds available for investment and the length of time for which they can be invested. A firm may invest its funds in the following:

1. Time deposits, including savings accounts earning daily interest, long-term savings accounts, and certificates of deposit
2. Money market funds, which are managed portfolios of short-term, high-grade debt instruments such as Treasury bills and commercial paper
3. Demand deposits that pay interest
4. U.S. Treasury securities

When cash receipts and disbursements are highly synchronized and predictable, a firm may keep a small cash balance. The financial manager must accurately forecast the amount of cash needed, its source, and its destination. These data are needed on both a short- and a long-term basis. Forecasting assists the manager in properly timing financing, debt repayment, and the amount to be transferred between accounts.

In deciding whether to adopt a cash management system, the financial manager should consider its associated costs versus the return earned from implementation of the system. Costs related to cash management systems include bank charges, financial manager's time, and office employee salaries. Some cash management systems use the firm's computer to make transactions with the computers of banks and money market funds. Computer systems are also useful for purchasing and selling securities in the money market.

Companies with many bank accounts should guard against accumulating excessive balances. Less cash needs to be kept on hand when a company can borrow quickly from a bank, such as under a *line of credit agreement*, which permits a firm to borrow instantly up to a specified maximum amount. A company may also find some cash unnecessarily tied up in other accounts, such as advances to employees. Excess cash should be invested in marketable securities for a return. Note however that cash in some bank accounts may not be available for investment. For instance, when a bank lends money to a company, the bank often requires the company to keep funds on hand as collateral. This deposit is called a compensating balance, which in effect represents *restricted* cash for the company.

Holding marketable securities serves as protection against cash shortages. Companies with seasonal operations may buy marketable securities when they have excess funds and then sell the securities when cash deficits occur. A firm may also invest in marketable securities when funds are being held temporarily in anticipation of short-term capital expansion. In selecting an investment portfolio, consideration should be given to return, default risk, marketability, and maturity date.

The thrust of cash management is to accelerate cash receipts and delay cash payments. Each bank account should be analyzed as to its type, balance, and cost so that corporate return is maximized.

Acceleration of Cash Inflow

To accelerate cash inflow, the financial manager must (1) know the bank's policy regarding fund availability; (2) know the source and location of company receipts; and (3) devise procedures for quick deposit of checks received and quick transfer of receipts in outlying accounts into the main corporate account.

The various types of check processing delays that must be analyzed are: (1) mail float—the time required for a check to move from a debtor to a creditor; (2) processing float—the time it takes for a creditor to deposit the check after receipt; and (3) deposit collection float—the time required for a check to clear.

Mail float can be minimized by having the collection center located near the customer. Local banks should be selected to speed the receipt of funds for subsequent transfer to the central corporate account. As an alternative, strategic post office lockboxes may be used for customer remissions. The local bank collects from these boxes periodically during the day and deposits the funds in the corporate account. The bank also furnishes the company with a computer listing of payments received by account and a daily total. Because the lockbox system has a significant per-item cost, it is most cost-effective with low-volume, high-dollar remissions. However, the system is becoming increasingly more available to companies with high-volume, low-dollar deposits as technological advances (such as machine-readable documents) lower the per-item cost of lockboxes.

Before a lockbox system is implemented, the company should make a cost–benefit analysis that considers the average dollar amount of checks received, the costs saved by having lockboxes, the reduction in mailing time per check, and the processing cost.

EXAMPLE 4.2 Chaset Corporation obtains average cash receipts of $200,000 per day. It usually takes 5 days from the time a check is mailed to its availability for use. The amount tied up by the delay is:

$$5 \text{ days} \times \$200{,}000 = \$1{,}000{,}000$$

EXAMPLE 4.3 It takes Travis Corporation about 7 days to receive and deposit payments from customers. Therefore, a lockbox system is being considered. It is expected that the system will reduce the float time to 5 days. Average daily collections are $500,000. The rate of return is 12 percent.

The reduction in outstanding cash balances arising from implementing the lockbox system is:

$$2 \text{ days} \times \$500{,}000 = \$1{,}000{,}000$$

The return that could be earned on these funds is:

$$\$1{,}000{,}000 \times 0.12 = \$120{,}000$$

The maximum monthly charge the company should pay for this lockbox arrangement is therefore:

$$\frac{\$120{,}000}{12} = \$10{,}000$$

EXAMPLE 4.4 Charles Corporation is exploring the use of a lockbox system that will cost $100,000 per year. Daily collections average $350,000. The lockbox arrangement will reduce the float period by 2 days. The firm's rate of return is 15 percent.

The cost–benefit analysis is shown below.

Return on early collection of cash $0.15 \times 2 \times \$350{,}000$	$105,000
Cost	100,000
Advantage of lockbox	$ 5,000

A corporate financial manager should determine whether it would be financially advantageous to split a geographic collection region into a number of parts.

EXAMPLE 4.5 Travis Company has an agreement with Charter Bank in which the bank handles $3 million in collections a day and requires a $700,000 compensating balance. Travis is thinking of canceling the agreement and dividing its western region so that two other banks will handle its business instead. Bank A will handle $1 million a day of collections, requiring a compensating balance of $300,000, and bank B will handle the other $2 million a day, asking for a compensating balance of $500,000. Travis's financial manager anticipates that collections will be accelerated by $\frac{1}{4}$ day if the western region is divided. The company's rate of return is 14 percent.

The financial manager decided that the new arrangement should be implemented, based on the following analysis:

Acceleration in cash receipts $3 million per day $\times \frac{1}{4}$ day	$750,000
Additional compensating balance required	100,000
Increased cash flow	$650,000
Rate of return	× 0.14
Net annual savings	$ 91,000

Concentration banking should also be considered for use. With this method funds are collected by several local banks and transferred to a main *concentration* account in another bank. The transfer of funds between banks should be accomplished through the use of depository transfer checks (DTCs) or wire transfers. In the DTC arrangement, there exists a resolution statement with the bank in which signatureless checks are allowed to be deposited. As the initial banks collect the funds, information is immediately transferred to the concentration bank, which then issues a DTC to collect the outlying funds. The funds may be available the same day.

Once remissions have been accelerated, freed cash should be used for investment in marketable securities or to pay off short-term debt. Thus, the freed cash will generate interest revenue to the business. The revenue derived can be determined for a given month by multiplying the monthly average accounts receivable balance times the associated monthly interest rate (i.e., the interest rate on marketable securities or the interest rate applicable to short-term debt).

EXAMPLE 4.6 A firm's weekly average cash balances are as follows:

Week	Average Cash Balance
1	$12,000
2	17,000
3	10,000
4	15,000
Total	$54,000

The monthly average cash balance is:

$$\frac{\$54,000}{4} = \$13,500$$

If the annual interest rate is approximated at 12 percent, the monthly return earned on the average cash balance is:

$$\$13,500 \times 0.1 = \$135$$

For a cash acceleration system to be feasible, the return earned on the freed cash must exceed the cost of the system.

Delay of Cash Outflow

There are various ways to delay cash disbursements, including:

1. Using drafts to pay bills since drafts are not due on demand. When a bank receives a draft it must return the draft to the issuer for acceptance prior to payment. When the company accepts the draft, it then deposits the required funds with the bank; hence, a smaller average checking balance is maintained.
2. Mailing checks from post offices having limited service or from locations where the mail must go through several handling points, lengthening the payment period.
3. Drawing checks on remote banks or establishing cash disbursement centers in remote locations so that the payment period is lengthened. For example, someone in New York can be paid with a check drawn on a California bank.
4. Using credit cards and charge accounts in order to lengthen the time between the acquisition of goods and the date of payment for those goods.

The cash disbursements of a firm may be controlled by centralizing its payable operation so that it satisfies its obligations at optimum times. Centralization will also facilitate the prediction of the disbursement float.

Payments to vendors should be delayed to the maximum as long as there is no associated finance charge or impairment of the company's credit rating. Of course, bills should not be paid prior to their due dates because of the time value of money.

A company can minimize its cash balances by using probabilities related to the expected time that checks will clear. Deposits, for example, may be made to a payroll checking account based on the expected time needed for the checks to clear.

Although not a delay of cash outflow, a company may reduce its cash outflow by the early repayment of a loan, thus avoiding some payment of interest. The company should consider the wire transfer of funds if a quick payment method is called for, especially if the payment is to be made to a distant location.

EXAMPLE 4.7 Every 2 weeks, company X disburses checks that average $500,000 and take 3 days to clear. How much money can the company save annually if it delays transfer of funds from an interest-bearing account that pays 0.0384 percent per day (annual rate of 14 percent) for those 3 days?

The interest for 3 days is:

$$\$500{,}000 \times (0.000384 \times 3) = \$576$$

The number of 2-week periods in a year is:

$$\frac{52 \text{ weeks}}{2 \text{ weeks}} = 26$$

The savings per year is:

$$\$576 \times 26 = \$14{,}976$$

Opportunity Cost of Forgoing a Cash Discount

An *opportunity cost* is the net revenue lost by rejecting an alternative action. A firm should typically take advantage of a discount offered by a creditor because of the associated high opportunity cost. For example, if the terms of sale are 2/10, net/30, the customer has 30 days to pay the bill but will get a 2 percent discount if he or she pays in 10 days. Some companies use seasonal datings such as 2/10, net/30, July 1 dating. Here, with an invoice dated July 1, the discount can be taken until July 10.

The following formula may be used to compute the opportunity cost in percentage, on an annual basis, of not taking a discount:

$$\text{Opportunity cost} = \frac{\text{discount percent}}{100 - \text{discount percent}} \times \frac{360}{N}$$

where N = the number of days payment can be delayed by forgoing the cash discount
= days credit is outstanding − discount period

The numerator of the first term (discount percent) is the cost per dollar of credit, whereas the denominator (100 − discount percent) represents the money made available by forgoing the cash discount. The second term represents the number of times this cost is incurred in a year.

EXAMPLE 4.8 The opportunity cost of not taking a discount when the terms are 3/15, net/60 is computed as follows:

$$\text{Opportunity cost} = \frac{3}{100-3} \times \frac{360}{60-15} = \frac{3}{97} \times \frac{360}{45} = 24.7\%$$

Determination of the Optimal Cash Balance

There are two techniques for deciding how much cash to maintain at any given point, considering that both holding cash and investing it have both advantages and disadvantages. The purpose of cash models is to satisfy cash requirements at the least cost.

Baumol's Model

It attempts to determine the optimum amount of transaction cash under conditions of certainty. The objective is to minimize the sum of the fixed costs of transactions and the opportunity cost of holding cash balances. These costs are expressed as:

$$b \times \frac{(\mathrm{T})}{\mathrm{C}} + \frac{i(\mathrm{C})}{2}$$

where b = the fixed cost of a transaction, T = the total cash needed for the time period involved, i = the interest rate on marketable securities, and C = cash balance.

The optimal level of cash is determined using the following formula:

$$C^* = \sqrt{\frac{2bT}{i}}$$

EXAMPLE 4.9 You estimate a cash need for $4,000,000 over a 1-month period where the cash account is expected to be disbursed at a constant rate. The opportunity interest rate is 6% per annum, or 0.5 percent for a 1-month period. The transaction cost each time you borrow or withdraw is $100.

The optimal transaction size (the optimal borrowing or withdrawal lot size) and the number of transactions you should make during the month follow:

$$C^* = \sqrt{\frac{2bT}{i}} = \sqrt{\frac{2(100)(4{,}000{,}000)}{0.005}} = \$400{,}000$$

The optimal transaction size is $400,000. The average cash balance is:

$$\frac{C^*}{2} = \frac{\$400{,}000}{2} = \$200{,}000$$

The number of transactions required are:

$$\frac{\$4{,}000{,}000}{\$400{,}000} = 10 \text{ transactions during the month.}$$

The Miller–Orr Model

The Miller–Orr model is a stochastic model for cash management where *uncertainty* exists for cash payments. In other words, there is irregularity of cash payments. The Miller–Orr model places an upper and lower limit for cash balances. When the upper limit is reached a transfer of cash to marketable securities or other suitable investments is made. When the lower limit is reached a transfer from securities to cash occurs. A transaction will not occur as long as the cash balance falls within the limits.

The Miller–Orr model takes into account the fixed costs of a securities transaction (b), assumed to be the same for buying as well as selling, the daily interest rate on marketable securities (i), and the variance of daily net cash flows (s^2). A major assumption is the randomness of cash flows. The two control limits in the Miller–Orr model may be specified as "h" dollars as an upper limit and zero dollars at the lower limit. When the cash balance reaches the upper level, h less z dollars of securities are bought and the new balance equals zero, z dollars of securities are sold and the new balance again reaches z.

The optimal cash balance z is computed as follows:

$$z = \sqrt[3]{\frac{3bs^2}{4i}}$$

The optimal value for h is computed as $3z$. The average cash balance will approximate $(z + h)/3$.

EXAMPLE 4.10 Delta Inc. has experienced a stochastic demand for its product, which results in fluctuating cash balances randomly. The following information is supplied:

Fixed cost of a securities transaction	$10
Variance of daily net cash flows	$50
Daily interest rate on securities (10%/360)	0.0003

The optimal cash balance, the upper limit of cash needed, and the average cash balance follow:

$$z = \sqrt[3]{\frac{3(10)(50)}{4(0.0003)}} = \sqrt[3]{\frac{3(10)(50)}{0.0012}} = \sqrt[3]{\frac{1.500}{0.0012}}$$

$$= 3\sqrt{1{,}250{,}000} = \$102$$

The optimal cash balance is \$102. The upper limit is \$306($3 \times \$102$). The average cash balance is

$$\frac{(\$102 + \$306)}{3} = \$136$$

When the upper limit of \$306 is reached, \$204 of securities (\$306 − \$102) will be purchased to bring you to the optimal cash balance of \$102. When the lower limit of zero dollars is reached, \$102 of securities will be sold to again bring you to the optimal cash balance of \$102.

4.4 MANAGEMENT OF ACCOUNTS RECEIVABLE

Consideration should be given to the company's investment in accounts receivable since there is an opportunity cost associated with holding receivable balances. The major decision regarding accounts receivable is the determination of the amount and terms of credit to extend to customers. The credit terms offered have a direct bearing on the associated costs and revenue to be generated from receivables. For example, if credit terms are tight, there will be less of an investment in accounts receivable and less bad debt losses, but there will also be lower sales and reduced profits.

In evaluating a potential customer's ability to pay, consideration should be given to the firm's integrity, financial soundness, collateral to be pledged, and current economic conditions. A customer's credit soundness may be evaluated through quantitative techniques such as regression analysis. Such techniques are most useful when a large number of small customers are involved. Bad debt losses can be estimated reliably when a company sells to many customers and when its credit policies have not changed for a long period of time.

The collection period for accounts receivable partly depends on the firm's credit policy and economic conditions, such as a recessionary environment, a period of limited or tight credit, or both.

In managing accounts receivable, the following procedures are recommended. First, establish a *credit policy*:

1. A detailed review of a potential customer's soundness should be made prior to extending credit. Procedures such as a careful review of the customer's financial statements and credit rating, as well as a review of financial service reports (e.g., Dun & Bradstreet), are common.
2. As customer financial health changes, credit limits should be revised.
3. Marketing factors must be noted since an excessively restricted credit policy will lead to lost sales.
4. If seasonal datings are used, the firm may offer more liberal payments than usual during slow periods in order to stimulate business by selling to customers who are unable to pay until later in the season. This policy is financially appropriate when the return on the additional sales plus the lowering in inventory costs is greater than the incremental cost associated with the additional investment in accounts receivable.

Second, establish policy concerning *billing*:

1. Customer statements should be sent within 1 day subsequent to the close of the period.
2. Large sales should be billed immediately.
3. Customers should be invoiced for goods when the order is processed rather than when it is shipped.
4. Billing for services should be done on an interim basis or immediately prior to the actual services. The billing process will be more uniform if cycle billing is employed.
5. The use of seasonal datings should be considered. (See item 4, concerning credit policy.)

Finally, establish policy concerning *collection*:

[1] Aging is simply determining the length of time an account is past due.

1. Accounts receivable should be aged[1] in order to identify delinquent and high-risk customers. The aging should be compared to industry norms.
2. Collection efforts should be undertaken at the very first sign of customer financial unsoundness.

EXAMPLE 4.11 Jones Corporation sells on terms of net/60. Its accounts are on the average 30 days past due. Annual credit sales are $500,000. The investment in accounts receivable is:

$$\frac{90}{360} \times \$500{,}000 = \$125{,}000$$

EXAMPLE 4.12 The cost of a given product is 40 percent of selling price, and carrying cost is 12 percent of selling price. On average, accounts are paid 90 days subsequent to the sale date. Sales average $40,000 per month. The investment in accounts receivable from this product is:

Accounts receivable:	
3 months × $40,000 sales =	$120,000
Investment in accounts receivable:	
$120,000 × (0.40 + 0.12) =	$ 62,400

EXAMPLE 4.13 A company has accounts receivable of $700,000. The average manufacturing cost is 40 percent of the sales price. The before-tax profit margin is 10 percent. The carrying cost of inventory is 3 percent of selling price. The sales commission is 8 percent of sales. The investment in accounts receivable is:

$$\$700{,}000(0.40 + 0.03 + 0.08) = \$700{,}000(0.51) = \$357{,}000$$

EXAMPLE 4.14 If a company's credit sales are $120,000, the collection period is 60 days, and the cost is 80 percent of sales price, what is (*a*) the average accounts receivable balance and (*b*) the average investment in accounts receivable?

(*a*) Accounts receivable turnover: $\frac{360}{60} = 6$

$$\text{Average accounts receivable} = \frac{\text{credit sales}}{\text{turnover}} = \frac{\$120{,}000}{6} = \$20{,}000$$

(*b*) Average investment in accounts receivable = $20,000 × 0.80 = $16,000

It pays for a firm to give a discount for early payment by customers when the return on the funds received early is greater than the cost of the discount.

EXAMPLE 4.15 Lakeside Corporation provides the following data:

Current annual credit sales	$12,000,000
Collection period	2 months
Terms	net/30
Rate of return	15%

Lakeside proposes to offer a 3/10, net/30 discount. The corporation anticipates 25 percent of its customers will take advantage of the discount. As a result of the discount policy, the collection period will be reduced to $1\frac{1}{2}$ months. Should Lakeside offer the new terms?

The discount policy is disadvantageous, as indicated below.

Current average accounts receivable balance ($12,000,000/6)	$2,000,000
Average accounts receivable balance—after policy change ($12,000,000/8)	1,500,000
Reduction in average accounts receivable	$ 500,000
Rate of return	×0.15
Dollar return earned	$ 75,000
Cost of discount (0.25 × $12,000,000 × 0.03)	$ 90,000
Disadvantage of discount policy ($90,000 − $75,000)	$ 15,000

A firm may consider offering credit to customers with a higher-than-normal risk rating. Here, the profitability on additional sales generated must be compared with the amount of additional bad debts expected, higher investing and collection costs, and the opportunity cost of tying up funds in receivables for a longer period of time. When idle capacity exists, the additional profitability represents the incremental contribution margin (sales less variable costs) since fixed costs remain the same. The incremental investment in receivables represents the average accounts receivable multiplied by the ratio of per-unit cost to selling price.

EXAMPLE 4.16 Joseph Corporation, which has idle capacity, provides the following data:

Selling price per unit	$80
Variable cost per unit	$50
Fixed cost per unit	$10
Annual credit sales	300,000 units
Collection period	2 months
Rate of return	16%

The corporation is considering a change in policy that will relax its credit standards. The following information applies to the proposal:

1. Sales will increase by 20 percent.
2. Collection period will go to 3 months.
3. Bad debt losses are expected to be 3 percent of the increased sales.
4. Collection costs are expected to increase by $20,000.

The analysis of its proposed credit policy change follows:

Concerning incremental profitability:

Increased unit sales (300,000 × 0.20)	60,000
Per-unit contribution margin ($80 − $50)	× $30
Incremental profit	$1,800,000

Concerning additional bad debts:

Incremental dollar sales (60,000 × $80)	$4,800,000
Bad debt percentage	× 0.03
Additional bad debts	$ 144,000

New average unit cost is:

	Units	Unit Cost	Total Cost
Current	300,000	$60	$18,000,000
Increment	60,000	$50[a]	3,000,000
Total	360,000		$21,000,000

$$\text{New average unit cost} = \frac{\$21,000,000}{360,000} = \$58.33$$

[a] Since idle capacity exists, the per-unit cost on the incremental sales is solely the variable cost of $50.

Additional cost of higher investment in average accounts receivable is:

Investment in average accounts receivable after the change in policy	$5,249,700[a]
Current investment in average accounts receivable	3,000,000[b]
Incremental investment in average accounts receivable	$2,249,700
Rate of return	× 0.16
Additional cost	$ 359,952

[a] $\frac{\text{Credit sales}}{\text{turnover}} \times \frac{\text{unit cost}}{\text{selling price}} = \frac{\$28,800,000}{4} \times \frac{\$58.33}{\$80.00} = \$5,249,700$

[b] $\frac{\$24,000,000}{6} \times \frac{\$60}{\$80} = \$3,000,000$

The net advantage/disadvantage is:

Incremental profitability		$1,800,000
Less: Additional bad debts	$144,000	
Additional collection costs	20,000	
Opportunity cost	359,952	523,952
Net advantage/disadvantage		$1,276,048

Since the net advantage is considerable, Joseph Corporation should relax its credit policy.

EXAMPLE 4.17 Wise Corporation is considering liberalizing its credit policy to encourage more customers to purchase on credit. Currently, 80 percent of sales are on credit and there is a gross margin of 30 percent. Other relevant data are:

	Currently	Proposal
Sales	$300,000	$450,000
Credit sales	$240,000	$360,000
Collection expenses	4% of credit sales	5% of credit sales
Accounts receivable turnover	4.5	3

An analysis of the proposal yields the following results:

Average accounts receivable balance (credit sales/accounts receivable turnover)	
Expected average accounts receivable ($360,000/3)	$120,000
Current average accounts receivable ($240,000/4.5)	53,333
Increase	$ 66,667
Gross profit	
Expected increase in credit sales ($360,000 − $240,000)	$120,000
Gross profit rate	0.30
Increase	$ 36,000
Collection expenses	
Expected collection expenses (0.05 × $360,000)	$ 18,000
Current collection expenses (0.04 × $240,000)	9,600
Increase	$ 8,400

Wise Corporation would benefit from a more liberal credit policy.

When a company is considering initiating a sales campaign in order to improve income, incremental profitability is compared to the cost of the discount and the opportunity cost associated with the higher investment in accounts receivable.

EXAMPLE 4.18 Drake Company is planning a sales campaign, during which Drake will offer credit terms of 4/20, net/60. Drake anticipates its collection period will rise from 70 days to 90 days. Data for the contemplated campaign are:

	% of Sales Prior to Campaign	% of Sales During Campaign
Cash sales	30	20
Payment from		
1–20	50	45
21–100	20	35

The proposed sales strategy will likely increase sales from $6 million to $7 million. The gross profit rate is 20 percent, and the rate of return is 12 percent. Sales discounts are given on cash sales.

An analysis of the proposed sales campaign is as follows:

	Sales Campaign			
	Without Campaign		**With Campaign**	
Gross profit		$1,200,000		$1,400,000
Sales subject to discount				
$0.8 \times \$6{,}000{,}000$	$4,800,000			
$0.65 \times \$7{,}000{,}000$			$4,550,000	
Sales discount	$\times 0.4$	−192,000	$\times 0.04$	−182,000
Investment in average accounts receivable				
$70/360 \times \$6{,}000{,}000 \times 0.8$	$ 933,333			
$90/360 \times \$7{,}000{,}000 \times 0.8$			$1,400,000	
Rate of return	$\times 0.12$	−112,000	$\times 0.12$	−168,000
Net profit		$ 896,000		$1,050,000

Drake should initiate the sales program since it will generate an additional profit of $154,000.

A business may wish to evaluate a credit policy that would extend credit to currently limited-credit or no-credit customers. Full credit should only be given to a customer category if net earnings ensue.

EXAMPLE 4.19 TGD Corporation has three credit categories (X, Y, Z) and is considering changing its credit policy for categories Y and Z. The pertinent data are:

Category	Bad Debt (%)	Collection Period (Days)	Credit Terms	Additional Annual Sales if Credit Restrictions Are Eased
X	2	30	Full	$100,000
Y	5	50	Restricted	$400,000
Z	13	80	No credit	$900,000

Gross profit approximates 15 percent of sales. The rate of return is 16 percent.

Analysis of the data yields the following results:

	Category Y		**Category Z**	
Gross profit				
$\$400{,}000 \times 0.15$		$60,000		
$\$900{,}000 \times 0.15$				$135,000
Increment in bad debts				
$\$400{,}000 \times 0.05$		−20,000		
$\$900{,}000 \times 0.13$				−117,000
Incremental average in accounts receivable				
$50/360 \times 0.85 \times \$400{,}000$	$47,222			
$80/360 \times 0.85 \times \$900{,}000$			$170,000	
Rate of return	$\times 0.16$		$\times 0.16$	
Additional cost		−7,556		−27,200
Net profitability		$32,444		$ −9,200

Credit should be eased only for category Y. Extending credit to category Z is likely to incur a loss for the company.

4.5 INVENTORY MANAGEMENT

The three types of inventory are: (1) raw materials, which are materials acquired from a supplier that will be used in the manufacture of goods; (2) work-in-process, which is partially completed goods at the end of the accounting period; and (3) finished goods, which are completed goods awaiting sale.

In managing inventory, the financial manager should:

1. Appraise the adequacy of the raw materials level, which depends on expected production, condition of equipment, and any seasonal considerations of business.
2. Forecast future movements in raw materials prices, so that if prices are expected to increase, additional material is purchased at the lower price.
3. Discard slow-moving products to reduce inventory carrying costs and improve cash flow.
4. Guard against inventory buildup, since it is associated with substantial carrying and opportunity costs.
5. Minimize inventory levels when liquidity and/or inventory financing problems exist.
6. Plan for a stock inventory balance that will guard against and cushion the possible loss of business from a material shortage.
7. Examine the quality of merchandise received. In this connection, the ratio of purchase returns to purchases should be examined. A sharp increase in the ratio indicates that a new supplier may be needed.
8. Keep a careful record of back orders. A high back order level indicates that less inventory balances are required. This is because back orders may be used as indicators of the production required, resulting in improved production planning and procurement. The trend in the ratio of the dollar amount of back orders to the average per-day sales will prove useful.
9. Appraise the acquisition and inventory control functions. Any problems must be identified and rectified. In areas where control is weak, inventory balances should be restricted.
10. Closely supervise warehouse and materials handling staff to guard against theft loss and to maximize efficiency.
11. Minimize the lead time in the acquisition, manufacturing, and distribution functions. The lead time in receiving goods is determined by dividing the value of outstanding orders by the average daily purchases. This ratio may indicate whether an increase in inventory stocking is required or whether the purchasing pattern should be altered.
12. Examine the time between raw materials input and the completion of production to see if production and engineering techniques can be implemented to hasten the production operation.
13. Examine the degree of spoilage.
14. Maintain proper inventory control, such as through the application of computer techniques and operations research.

The financial manager must also consider the risk associated with inventory. For example, technological, perishable, fashionable, flammable, and specialized goods usually have a high realization risk. The nature of the risk associated with the particular inventory item should be taken into account in computing the desired inventory level.

Inventory management involves a trade-off between the costs associated with keeping inventory versus the benefits of holding inventory. Higher inventory levels result in increased costs from storage,

insurance, spoilage, and interest on borrowed funds needed to finance inventory acquisition. However, an increase in inventory lowers the possibility of lost sales from stockouts and the incidence of production slowdowns from inadequate inventory. Further, large volume purchases will result in greater purchase discounts. Inventory levels are also influenced by short-term interest rates. For example, as short-term interest rates increase, the optimum level of holding inventory will be reduced.

Inventory should be counted at regular, cyclic intervals because this provides the ability to check inventory on an ongoing basis as well as to reconcile the book and physical amounts. Cyclic counting has the following advantages:

1. It allows for an efficient use of a few full-time experienced counters throughout the year.
2. It enables the timely detection and correction of the causes of inventory error.
3. It does not require a plant shutdown, as does a year-end count.
4. It facilitates the modification of computer inventory programs if needed.

A quantity discount may be received when purchasing large orders. The discount serves as a reduction of the acquisition cost of materials.

EXAMPLE 4.20 A company purchases 1,000 units of an item having a list price of $10 each. The quantity discount is 5 percent. The net cost of the item is:

Acquisition cost (1,000 × $10)	$10,000
Less: Discount (0.05 × $10,000)	500
Net cost	$ 9,500

The average investment in inventory should be considered.

EXAMPLE 4.21 Savon Corporation places an order for 5,000 units at the beginning of the year. Each unit costs $10. The average investment is:

Average inventory[a]	2,500 units
Unit cost, $	× $10
Average investment	$25,000

[a] $\frac{\text{Quantity } (Q)}{2} = \frac{5{,}000}{2}$

The more frequently a company places an order, the lower will be the average investment.

Carrying and Ordering Costs

Inventory carrying costs include those for warehousing, handling, insurance, and property taxes. A provisional cost for spoilage and obsolescence should also be included in an analysis of inventory. In addition, the opportunity cost of holding inventory balances must be considered. Assuming that the carrying cost per unit is constant, then

$$\text{Carrying cost} = \frac{Q}{2} \times C$$

where $Q/2$ represents average quantity and C is the carrying cost per unit.

Inventory order costs are the costs of placing an order and receiving the merchandise. They include freight charges and the clerical costs to place an order. In the case of produced items, they also include

the scheduling cost. The ordering cost per unit is assumed to be constant.

$$\text{Ordering cost} = \frac{S}{Q} \times P$$

where S = total usage
Q = quantity per order
P = cost of placing an order

The total inventory cost is therefore:

$$\frac{QC}{2} + \frac{SP}{C}$$

A trade-off exists between ordering and carrying costs. A greater order quantity will increase carrying costs but lower ordering costs.

Economic Order Quantity (EOQ)

The economic order quantity (EOQ) is the optimum amount of goods to order each time an order is placed so that total inventory costs are minimized.

$$\text{EOQ} = \sqrt{\frac{2SP}{C}}$$

The number of orders to be made for a period is the usage (S) divided by the EOQ.

EXAMPLE 4.22 Winston Corporation needs to know how frequently to place their orders. They provide the following information:

S = 500 units per month
P = \$40 per order
C = \$4 per unit

$$\text{EOQ} = \sqrt{\frac{2SP}{C}} = \sqrt{\frac{2(500)(40)}{4}} = \sqrt{10{,}000} = 100 \text{ units}$$

The number of orders required each month is:

$$\frac{S}{\text{EOQ}} = \frac{500}{100} = 5$$

Therefore, an order should be placed about every 6 days (31/5).

EXAMPLE 4.23 Apex Appliance Store is determining its frequency of orders for toasters. Each toaster costs \$15. The annual carrying costs are approximated at \$200. The ordering cost is \$10. Apex expects to sell 50 toasters each month. Its desired average inventory level is 40.

$S = 50 \times 12 = 600$
P = \$10

$$C = \frac{\text{purchase price} \times \text{carrying cost}}{\text{average investment}} = \frac{\$15 \times \$200}{40 \times \$15} = \$5$$

$$\text{EOQ} = \sqrt{\frac{2SP}{C}} = \sqrt{\frac{2(600)(10)}{5}} = \sqrt{\frac{12{,}000}{5}} = \sqrt{2{,}400} = 49 \text{ (rounded)}$$

The number of orders per year is:

$$\frac{S}{\text{EOQ}} = \frac{600}{49} = 12 \text{ orders (rounded)}$$

Apex Appliance should place an order about every 30 days (365/12).

During periods of inflation and tight credit, a company should be flexible in its inventory management policies. For example, its EOQ model will have to be modified to reflect rising costs.

Stockouts

Stockout of raw materials or work-in-process can result in a shutdown or slowdown in the production process. In order to avoid a stockout situation, a safety stock level should be maintained. Safety stock is the minimum inventory amount needed for an item, based on anticipated usage and the expected delivery time of materials. This cushion guards against unusual product demand or unexpected delivery problems.

EXAMPLE 4.24 Winston Corporation places an order when its inventory level reaches 210 rather than 180 units. Its safety stock is 30 units. In other words, the company expects to be stocked with 30 units when the new order is received.

The optimum safety stock level is the point where the increased carrying cost equals the opportunity cost associated with a potential stockout. The increased carrying cost is equal to the carrying cost per unit multiplied by the safety stock.

$$\text{Stockout cost} = \text{number of orders}\left(\frac{\text{usage}}{\text{order quantity}}\right) \times \text{stockout units} \times \text{unit stockout cost} \times \text{probability of a stockout}$$

EXAMPLE 4.25 Tristar Corporation uses 100,000 units annually. Each order placed is for 10,000 units. Stockout is 1,000 units; this amount is the difference between the maximum daily usage during the lead time less the reorder point, ignoring a safety stock factor. The stockout probability management wishes to take is 30 percent. The per-unit stockout cost is \$2.30. The carrying cost per unit is \$5. The inventory manager must determine (*a*) the stockout cost and (*b*) the amount of safety stock to keep on hand.

(*a*)
$$\text{Stockout cost} = \frac{\text{usage}}{\text{order quantity}} \times \text{stockout units} \times \text{unit stockout cost} \times \text{probability of a stockout}$$
$$= \frac{100{,}000}{10{,}000} \times 1{,}000 \times \$2.30 \times 0.3 = \$6{,}900$$

(*b*) Let X = safety stock

$$\text{Stockout cost} = \text{carrying cost of safety stock}$$
$$\$6{,}900 = \$5X$$
$$1{,}380 \text{ units} = X$$

Economic Order Point (EOP)

The economic order point is the inventory level that signals the time to reorder merchandise at the EOQ amount. Safety stock is provided for in the computation.

$$\text{EOP} = SL + z\sqrt{S(\text{EOQ})(L)}$$

where L = the lead time
z = the stockout acceptance factor

EXAMPLE 4.26 Blake Corporation provides the following data:

S = 2,000 units per month
EOQ = 75 units
$L = \frac{1}{4}$ of a month
z = 1.29, which represents the acceptable stockout level of 10 percent (from normal probability distribution table—Appendix E)

$$\text{EOP} = SL + z\sqrt{S(\text{EOQ})(L)} = (2{,}000)(\tfrac{1}{4}) + 1.29\sqrt{2{,}000(75)(\tfrac{1}{4})}$$
$$= 500 + 1.29\sqrt{37{,}500} = 500 + 1.29(193.6) = 750 \text{ (rounded)}$$

The financial manager should attempt to determine the inventory level that results in the greatest savings.

EXAMPLE 4.27 Frost Corporation is thinking of revising its inventory policy. The current inventory turnover is 16 times. Variable costs are 70 percent of sales. If inventory levels are increased, Frost anticipates additional sales generated and less of an incidence of inventory stockouts. The rate of return is 17 percent.

Actual and estimated sales and inventory turnover are as follows:

Sales	Turnover
$700,000	16
$780,000	14
$850,000	11
$940,000	7

Frost's financial manager can now compute the inventory level that will result in the highest net savings.

A	B	C	D	E	F
Sales	Turnover	Average Inventory (A ÷ B)	Opportunity Cost Associated with Additional Inventory[a]	Additional Profitability[b]	Net Savings (E − D)
$700,000	16	$ 43,750			
$780,000	14	$ 55,714	$2,034	$24,000	$21,966
$850,000	11	$ 77,273	$3,665	$21,000	$17,335
$940,000	7	$134,286	$9,692	$27,000	$17,308

[a] Incremental average inventory balance × 0.17 (the rate of return).
[b] Incremental sales × 0.30 (contribution margin).

The best inventory level is 55,714 units, since the greatest savings result at this point.

ABC Inventory Control Method

The ABC method of inventory control requires the classification of inventory into one of three groups, A, B, or C. Group A items are most expensive, group B less expensive, and group C the least expensive. The higher the value of the inventory items, the more control should be exercised over them.

Inventory should be analyzed frequently when using the ABC method. The procedure for constructing an ABC analysis follows:

1. Separate each type of inventory, such as finished goods, work-in-process, and raw materials.
2. Calculate the annual dollar usage for each type of inventory by multiplying the unit cost times the expected future annual usage.
3. Rank each inventory type from high to low, based on annual dollar usage.
4. Classify the inventory as A, B, or C, based on the top 20 percent, the next 30 percent, and the last 50 percent valuation, respectively.
5. Tag the inventory with ABC classifications and record those classifications in the item inventory master records.

Figure 4-1 illustrates the ABC distribution.

Inventory Classification	Population (%)	$ Usage (%)
A	20	80
B	30	15
C	50	5

Fig. 4-1 ABC inventory distribution

The ABC analysis become a tool with which the materials manager checks the accuracy of his or her records. More time is spent checking A category items than B and C items. The financial manager should establish an audit program for those records and items that have the greatest impact on profitability based on the ABC analysis.

Review Questions

1. _____ equals current assets less current liabilities.
2. In managing working capital, one should consider the trade-off between _____ and _____.
3. The financing of long-term assets with long-term debt is referred to as _____.
4. Cash consists of _____ and _____.
5. Cash held for emergency purposes is referred to as a(n) _____ balance.
6. Excess cash that will be needed in the near future should be temporarily invested in _____ securities.
7. The term _____ refers to funds retained by the bank on a loan made to the company.
8. The time required for a check to go from the maker to the payee is referred to as _____.
9. The time needed for a check to clear is referred to as _____.
10. A(n) _____ system is one in which a local bank picks up customer remissions from a post office box.
11. _____ is a system of collection in which a local bank receives funds and transfers them to a main concentration bank account.
12. One way to defer a cash payment is by the use of a(n) _____, because the bank must first secure approval from the company before the instrument is paid.

13. The terms of a $1,000 sale are 3/20, net/40. If collection is received in 14 days, the amount received is $_____.

14. Partially completed merchandise at year-end is referred to as _____ inventory.

15. Inventory consisting of fashionable merchandise has high _____ risk.

16. _____ refers to the cost of holding inventory.

17. As the order size increases, carrying cost _____ and ordering cost _____.

18. The optimum amount to order each time is referred to as the _____.

19. The optimum inventory level requiring a reorder of goods is referred to as the _____.

20. The _____ method requires that greater control be exercised over higher-valued merchandise.

Answers: (1) Net working capital; (2) risk, return; (3) hedging; (4) currency, demand deposits; (5) precautionary; (6) marketable; (7) compensating balance; (8) mail float; (9) deposit collection float; (10) lockbox; (11) Concentration banking; (12) draft; (13) 970; (14) work-in-process; (15) realization; (16) Carrying cost; (17) increases, decreases; (18) economic order quantity (EOQ); (19) economic order point (EOP); (20) ABC.