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**THESIS TOPIC:**

**A LINGUISTIC APPROACH TO FINANCIAL MANAGEMENT**



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## **CHAPTER 1. INTRODUCTION TO FINANCIAL MANAGEMENT**

### **INTRODUCTION**

Business concern needs finance to meet their requirements in the economic world. Any kind of business activity depends on the finance. Hence, it is called as lifeblood of business organization. Whether the business concerns are big or small, they need finance to fulfil their business activities.

In the modern world, all the activities are concerned with the economic activities and very particular to earning profit through any venture or activities. The entire business activities are directly related with making profit. (According to the economics concept of factors of production, rent given to landlord, wage given to labour, interest given to capital and profit given to shareholders or proprietors), a business concern needs finance to meet all the requirements. Hence finance may be called as capital, investment, fund etc., but each term is having different meanings and unique characters. Increasing the profit is the main aim of any kind of economic activity.

### **MEANING OF FINANCE**

Finance may be defined as the art and science of managing money. It includes financial service and financial instruments. Finance also is referred as the provision of money at the time when it is needed. Finance function is the procurement of funds and their effective utilization in business concerns.

The concept of finance includes capital, funds, money, and amount. But each word is having unique meaning. Studying and understanding the concept of finance become an important part of the business concern.

### **DEFINITION OF FINANCE**

According to Khan and Jain, "Finance is the art and science of managing money".

According to Oxford dictionary, the word 'finance' connotes 'management of money'.

Webster's Ninth New Collegiate Dictionary defines finance as "the Science on study of the management of funds' and the management of fund as the system that includes the circulation of money, the granting of credit, the making of investments, and the provision

of banking facilities.

### **DEFINITION OF BUSINESS FINANCE**

According to the Wheeler, "Business finance is that business activity which concerns with the acquisition and conversation of capital funds in meeting financial needs and overall objectives of a business enterprise".

According to the Guthumann and Dougall, "Business finance can broadly be defined as the activity concerned with planning, raising, controlling, administering of the funds used in the business".

In the words of Parhter and Wert, "Business finance deals primarily with raising, administering and disbursing funds by privately owned business units operating in nonfinancial fields of industry".

Corporate finance is concerned with budgeting, financial forecasting, cash management, credit administration, investment analysis and fund procurement of the business concern and the business concern needs to adopt modern technology and application suitable to the global environment.

According to the Encyclopedia of Social Sciences, "Corporation finance deals with the financial problems of corporate enterprises. These problems include the financial aspects of the promotion of new enterprises and their administration during early development, the accounting problems connected with the distinction between capital and income, the administrative questions created by growth and expansion, and finally, the financial adjustments required for the bolstering up or rehabilitation of a corporation which has come into financial difficulties".

### **TYPES OF FINANCE**

Finance is one of the important and integral part of business concerns, hence, it plays a major role in every part of the business activities. It is used in all the area of the activities under the different names.

Finance can be classified into two major parts:

Private Finance, which includes the Individual, Firms, Business or Corporate Financial activities to meet the requirements.

Public Finance which concerns with revenue and disbursement of Government such as Central Government, State Government and Semi-Government Financial matters.

## **DEFINITION OF FINANCIAL MANAGEMENT**

Financial management is an integral part of overall management. It is concerned with the duties of the financial managers in the business firm.

The term financial management has been defined by Solomon, "It is concerned with the efficient use of an important economic resource namely, capital funds".

The most popular and acceptable definition of financial management as given by S.C. Kuchal is that "Financial Management deals with procurement of funds and their effective utilization in the business".

Howard and Upton : Financial management "as an application of general managerial principles to the area of financial decision-making.

Weston and Brigham: Financial management "is an area of financial decision-making, harmonizing individual motives and enterprise goals".

Joshep and Massie : Financial management "is the operational activity of a business that is responsible for obtaining and effectively utilizing the funds necessary for efficient operations.

Thus, Financial Management is mainly concerned with the effective funds management in the business. In simple words, Financial Management as practiced by business firms can be called as Corporation Finance or Business Finance.

## **SCOPE OF FINANCIAL MANAGEMENT**

Financial management is one of the important parts of overall management, which is directly

related with various functional departments like personnel, marketing and production.

Financial management covers wide area with multidimensional approaches. The following are the important scope of financial management.

### **1. Financial Management and Economics**

Economic concepts like micro and macroeconomics are directly applied with the financial management approaches. Investment decisions, micro and macro environmental factors are closely associated with the functions of financial manager. Financial management also uses the economic equations like money value discount factor, economic order quantity etc. Financial economics is one of the emerging area, which provides immense opportunities to finance, and economical areas.

## **2. Financial Management and Accounting**

Accounting records includes the financial information of the business concern. Hence, we can easily understand the relationship between the financial management and accounting. In the olden periods, both financial management and accounting are treated as a same discipline and then it has been merged as Management Accounting because this part is very much helpful to finance manager to take decisions. But nowadays financial management and accounting discipline are separate and interrelated.

## **3. Financial Management or Mathematics**

Modern approaches of the financial management applied large number of mathematical and statistical tools and techniques. They are also called as econometrics. Economic order quantity, discount factor, time value of money, present value of money, cost of capital, capital structure theories, dividend theories, ratio analysis and working capital analysis are used as mathematical and statistical tools and techniques in the field of financial management.

## **4. Financial Management and Production Management**

Production management is the operational part of the business concern, which helps to multiple the money into profit. Profit of the concern depends upon the production performance. Production performance needs finance, because production department requires raw material, machinery, wages, operating expenses etc. These expenditures are decided and estimated by the financial department and the finance manager allocates the appropriate finance to production department. The financial manager must be aware of the operational process and finance required for each process of production activities.

## **5. Financial Management and Marketing**

Produced goods are sold in the market with innovative and modern approaches. For this, the marketing department needs finance to meet their requirements. The financial manager or finance department is responsible to allocate the adequate finance to the marketing department. Hence, marketing and financial management are interrelated and depends on each other.

## **6. Financial Management and Human Resource**

Financial management is also related with human resource department, which provides manpower to all the functional areas of the management. Financial manager should carefully evaluate the requirement of manpower to each department and allocate the finance to the human resource department as wages, salary, remuneration, commission, bonus, pension and other monetary benefits to the human resource department. Hence, financial management is directly related with human resource management.

## **OBJECTIVES OF FINANCIAL MANAGEMENT**

Effective procurement and efficient use of finance lead to proper utilization of the finance by the business concern. It is the essential part of the financial manager. Hence, the financial

manager must determine the basic objectives of the financial management. Objectives of Financial Management may be broadly divided into two parts such as:

1. Profit maximization
2. Wealth maximization.



### **Profit Maximization**

Main aim of any kind of economic activity is earning profit. A business concern is also



functioning mainly for the purpose of earning profit. Profit is the measuring techniques to understand the business efficiency of the concern. Profit maximization is also the traditional and narrow approach, which aims at, maximizes the profit of the concern. Profit maximization consists of the following important features.

1. Profit maximization is also called as cashing per share maximization. It leads to maximize the business operation for profit maximization.
2. Ultimate aim of the business concern is earning profit, hence, it considers all the possible ways to increase the profitability of the concern.
3. Profit is the parameter of measuring the efficiency of the business concern. So it shows the entire position of the business concern.
4. Profit maximization objectives help to reduce the risk of the business.

#### **Favorable Arguments for Profit Maximization**

The following important points are in support of the profit maximization objectives of the business concern:

- (i) Main aim is earning profit.
- (ii) Profit is the parameter of the business operation.
- (iii) Profit reduces risk of the business concern.
- (iv) Profit is the main source of finance.
- (v) Profitability meets the social needs also.

#### **Unfavorable Arguments for Profit Maximization**

The following important points are against the objectives of profit maximization:

- (i) Profit maximization leads to exploiting workers and consumers.
- (ii) Profit maximization creates immoral practices such as corrupt practice, unfair trade practice, etc.
- (iii) Profit maximization objectives leads to inequalities among the stake holders such as customers, suppliers, public shareholders, etc.

#### **Drawbacks of Profit Maximization**

Profit maximization objective consists of certain drawback also:

- (i) It is vague: In this objective, profit is not defined precisely or correctly. It creates some unnecessary opinion regarding earning habits of the business concern.
- (ii) It ignores the time value of money: Profit maximization does not consider the

time value of money or the net present value of the cash inflow. It leads certain differences between the actual cash inflow and net present cash flow during a particular period.

(iii) It ignores risk: Profit maximization does not consider risk of the business concern. Risks may be internal or external which will affect the overall operation of the business concern.

### **Wealth Maximization**

Wealth maximization is one of the modern approaches, which involves latest innovations and improvements in the field of the business concern. The term wealth means shareholder wealth or the wealth of the persons those who are involved in the business concern.

Wealth maximization is also known as value maximization or net present worth maximization. This objective is an universally accepted concept in the field of business.

### **Favourable Arguments for Wealth Maximization**

(i) Wealth maximization is superior to the profit maximization because the main aim of the business concern under this concept is to improve the value or wealth of the shareholders.

(ii) Wealth maximization considers the comparison of the value to cost associated with the business concern. Total value detected from the total cost incurred for the business operation. It provides extract value of the business concern.

(iii) Wealth maximization considers both time and risk of the business concern.

(iv) Wealth maximization provides efficient allocation of resources.

(v) It ensures the economic interest of the society.

### **Unfavorable Arguments for Wealth Maximization**

(i) Wealth maximization leads to prescriptive idea of the business concern but it may not be suitable to present day business activities.

(ii) Wealth maximization is nothing, it is also profit maximization, it is the indirect name of the profit maximization.

(iii) Wealth maximization creates ownership-management controversy.

(iv) Management alone enjoy certain benefits.

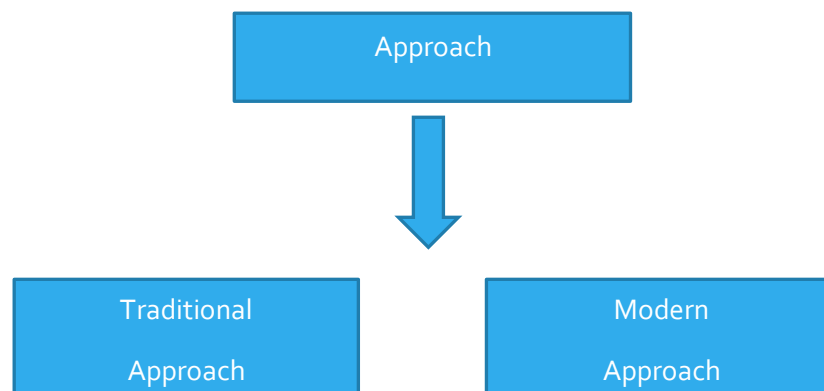
(v) The ultimate aim of the wealth maximization objectives is to maximize the profit.

(vi) Wealth maximization can be activated only with the help of the profitable position

of the business concern.

## **APPROACHES TO FINANCIAL MANAGEMENT**

Financial management approach measures the scope of the financial management in various fields, which include the essential part of the finance. Financial management is not a revolutionary concept but an evolutionary. The definition and scope of financial management has been changed from one period to another period and applied various innovations. Theoretical points of view, financial management approach may be broadly divided into two major parts.



### **Traditional Approach**

Traditional approach is the initial stage of financial management, which was followed, in the early part of during the year 1920 to 1950. This approach is based on the past experience and the traditionally accepted methods. Main part of the traditional approach is rising of funds for the business concern. Traditional approach consists of the following important area.

Arrangement of funds from lending body.

Arrangement of funds through various financial instruments.

Finding out the various sources of funds.

## **FUNCTIONS OF FINANCE MANAGER**

Finance function is one of the major parts of business organization, which involves the

permanent, and continuous process of the business concern. Finance is one of the interrelated

functions which deal with personal function, marketing function, production function and research and development activities of the business concern. At present, every business concern concentrates more on the field of finance because, it is a very emerging part which reflects the entire operational and profit ability position of the concern. Deciding the proper financial function is the essential and ultimate goal of the business organization.

Finance manager is one of the important role players in the field of finance function.

He must have entire knowledge in the area of accounting, finance, economics and management. His position is highly critical and analytical to solve various problems related to finance. A person who deals finance related activities may be called finance manager.

Finance manager performs the following major functions:

#### **1. Forecasting Financial Requirements**

It is the primary function of the Finance Manager. He is responsible to estimate the financial requirement of the business concern. He should estimate, how much finances required to acquire fixed assets and forecast the amount needed to meet the working capital requirements in future.

#### **2. Acquiring Necessary Capital**

After deciding the financial requirement, the finance manager should concentrate how the finance is mobilized and where it will be available. It is also highly critical in nature.

#### **3. Investment Decision**

The finance manager must carefully select best investment alternatives and consider the reasonable and stable return from the investment. He must be well versed in the field of capital budgeting techniques to determine the effective utilization of investment. The finance manager must concentrate to principles of safety, liquidity and profitability while investing capital.

#### **4. Cash Management**

Present days cash management plays a major role in the area of finance because proper cash management is not only essential for effective utilization of cash but it also helps to meet the short-term liquidity position of the concern.

## 5. Interrelation with Other Departments

Finance manager deals with various functional departments such as marketing, production, personnel, system, research, development, etc. Finance manager should have sound knowledge not only in finance related area but also well versed in other areas. He must maintain a good relationship with all the functional departments of the business organization.

## **IMPORTANCE OF FINANCIAL MANAGEMENT**

Finance is the lifeblood of business organization. It needs to meet the requirement of the business concern. Each and every business concern must maintain adequate amount of finance for their smooth running of the business concern and also maintain the business carefully to achieve the goal of the business concern. The business goal can be achieved only with the help of effective management of finance. We can't neglect the importance of finance at any time at and at any situation. Some of the importance of the financial management is as follows:

### **Financial Planning**

Financial management helps to determine the financial requirement of the business concern

and leads to take financial planning of the concern. Financial planning is an important part of the business concern, which helps to promotion of an enterprise.

### **Acquisition of Funds**

Financial management involves the acquisition of required finance to the business concern.

Acquiring needed funds play a major part of the financial management, which involve possible source of finance at minimum cost.

### **Proper Use of Funds**

Proper use and allocation of funds leads to improve the operational efficiency of the business

concern. When the finance manager uses the funds properly, they can reduce the cost of capital and increase the value of the firm.

### **Financial Decision**

Financial management helps to take sound financial decision in the business concern.

Financial decision will affect the entire business operation of the concern. Because there is

a direct relationship with various department functions such as marketing, production personnel, etc.

### **Improve Profitability**

Profitability of the concern purely depends on the effectiveness and proper utilization of funds by the business concern. Financial management helps to improve the profitability position of the concern with the help of strong financial control devices such as budgetary control, ratio analysis and cost volume profit analysis.

### **Increase the Value of the Firm**

Financial management is very important in the field of increasing the wealth of the investors and the business concern. Ultimate aim of any business concern will achieve the maximum profit and higher profitability leads to maximize the wealth of the investors as well as the nation.

### **Promoting Savings**

Savings are possible only when the business concern earns higher profitability and maximizing wealth. Effective financial management helps to promoting and mobilizing individual and corporate savings.

Nowadays financial management is also popularly known as business finance or corporate finances. The business concern or corporate sectors cannot function without the importance of the financial management.

## ***CHAPTER 2. FINANCIAL MARKETS AND INSTITUTIONS***

Over the past few decades, changing technology and improving communications have increased cross-border transactions and expanded the scope and efficiency of the global financial system. Companies routinely raise funds throughout the world; and with the click of a mouse, an investor can buy GE stock on the New York Stock Exchange, deposit funds in a European bank, or purchase a mutual fund that invests in Chinese securities. This globalization was dramatically illustrated in the fall of 2007. The U.S. housing market had been exceedingly strong, which bolstered the entire economy. Rising home values enabled people to borrow on home equity loans to buy everything from autos to Caribbean vacations. However, lenders had been making loans that required no down payment, which had “teaser” rates programmed to rise sharply after a year or two, and that were made to borrowers whose credit had not been carefully checked. These relaxed lending standards

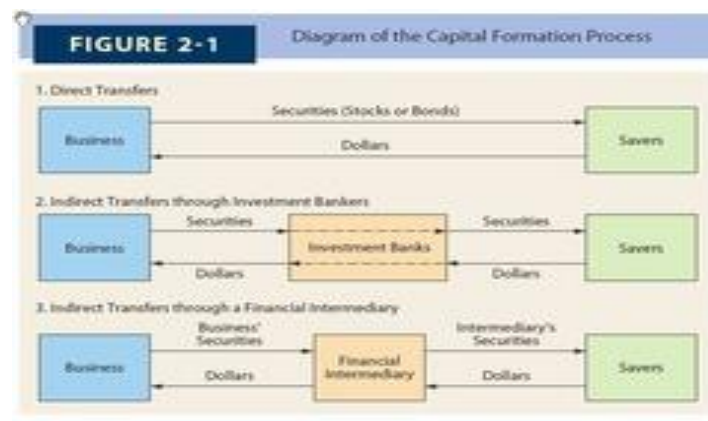
enabled people who could not have bought homes in the past to buy a home now; but the loans were getting riskier, and about 30% were classified as “subprime.” The risk buildup was obscured by fancy “financial engineering.” A few years ago people obtained mortgage loans primarily from local banks. The banks kept the mortgages, collected the interest, and likely knew how risky the loans were. In recent years, the situation has changed. Now mortgage brokers originate, for example, 500 loans for \$200,000 each, or \$100 million in total, and then sell them to an investment bank. The bank uses the loans as collateral for \$100 million of bonds, which are divided into classes such as A, B, and C. The A bonds have first claim on cash from the mortgages and are rated AAA; the Bs are next, which are also highly rated; and even the Cs are rated “investment grade.” Initially, times were good; the interest and repayment of principal from the mortgages were sufficient to cover required payments to all of the bonds. However, recently, some of the mortgages began going into default, and inflows were no longer sufficient to cover required payments to all of the bonds. When home prices are rising, borrowers’ equity also rises. That enables borrowers who cannot keep up with their payments to refinance—or sell the house for enough to pay off the mortgage. But when home prices start falling, refinancings and profitable sales are impossible. That triggers mortgage defaults, which, in turn, triggers defaults on the riskiest bonds. People become worried about the B and even the A bonds, so their values also fall. The banks and other institutions that own the bonds are forced to write them down on their balance sheets. Institutions that hold mortgage-backed bonds—many of which are subsidiaries of banks—raised the money to buy the bonds by borrowing on a 3-month basis from money market funds of similar lenders. As risks became more apparent, the short-term lenders refused to roll over these loans; thus, the bondholders were forced to sell bonds to repay their short-term loans. Those sales depressed the bond market even further, causing further bond sales, lower bond prices, and more write-downs. A downward spiral and a severe credit crunch began. Banks across the globe had invested in these bonds; and huge losses were reported by Citigroup, Deutsche Bank (Germany’s largest), and UBS (Switzerland’s largest). These losses reduced banks’ willingness and ability to make new loans, which threatened economies in many nations. The Federal Reserve and other central banks lowered interest rates and eased the terms under which they extended credit to banks, and the banks themselves joined forces to head off a downward spiral. The headline in The Wall Street Journal on October 13, 2007, read as follows: “Big Banks Push \$100 Billion Plan to Avert Credit Crunch.” The article described how government officials are working with bankers to head off an impending crisis. However, working things out will be difficult. Many think that the banks whose actions contributed to the problems—especially Citigroup—should not be bailed out. Others think that the crisis must be averted because the U.S. economy and other economies will be badly damaged if the downward spiral continues. All of this demonstrates the extent to which markets are interconnected, the impact markets can have on countries and on individual companies, and the complexity of capital markets.

## THE CAPITAL ALLOCATION PROCESS

Businesses, individuals, and governments often need to raise capital. For example, Carolina Power & Light (CP&L) forecasts an increase in the demand for electricity in North and South Carolina, so it will build a new power plant to meet those needs. Because CP&L’s bank account does not contain the \$1 billion necessary to pay for the plant, the company must

raise this capital in the financial markets. Similarly, Mr. Fong, the proprietor of a San Francisco hardware store, wants to expand into appliances. Where will he get the money to buy the initial inventory of TV sets, washers, and freezers? Or suppose the Johnson family wants to buy a home that costs \$200,000, but they have only \$50,000 in savings. Where will they get the additional \$150,000? The city of New York needs \$200 million to build a new sewer plant. Where can it obtain this money? Finally, the federal government needs more money than it receives from taxes. Where will the extra money come from? On the other hand, some individuals and firms have incomes that exceed their current expenditures, in which case they have funds available to invest. For example, Carol Hawk has an income of \$36,000, but her expenses are only \$30,000. That leaves her with \$6,000 to invest. Similarly, Microsoft has accumulated roughly \$23.5 billion of cash. What can Microsoft do with this money until it is needed in the business? People and organizations with surplus funds are saving today in order to accumulate funds for some future use. Members of a household might save to pay for their children's education and the parents' retirement, while a business might save to fund future investments. Those with surplus funds expect to earn a return on their investments, while people and organizations that need capital understand that they must pay interest to those who provide that capital. In a well-functioning economy, capital flows efficiently from those with surplus capital to those who need it.

This transfer can take place in the three ways described in Figure



1. Direct transfers of money and securities, as shown in the top section, occur when a business sells its stocks or bonds directly to savers, without going through any type of financial institution. The business delivers its securities to savers, who, in turn, give the firm the money it needs. This procedure is used mainly by small firms, and relatively little capital is raised by direct transfers.

2. As shown in the middle section, transfers may also go through an investment bank (iBank) such as Citigroup, which underwrites the issue. An underwriter serves as a middleman and facilitates the issuance of securities. The company sells its stocks or bonds to the investment bank, which then sells these same securities to savers. The businesses' securities and the savers' money merely "pass through" the investment bank. However, because the investment bank buys and holds the securities for a period of time, it is taking a risk—it may not be able to resell the securities to savers for as much as it paid. Because new securities are involved and the corporation receives the proceeds of the sale, this transaction is called a primary market transaction.



3. Transfers can also be made through a financial intermediary such as a bank, an insurance company, or a mutual fund. Here the intermediary obtains funds from savers in exchange for its securities. The intermediary uses this money to buy and hold businesses' securities, while the savers hold the intermediary's securities. For example, a saver deposits dollars in a bank, receiving a certificate of deposit; then the bank lends the money to a business in the form of a mortgage loan. Thus, intermediaries literally create new forms of capital—in this case, certificates of deposit, which are safer and more liquid than mortgages and thus are better for most savers to hold. The existence of intermediaries greatly increases the efficiency of money and capital markets.

Often the entity needing capital is a business (and specifically a corporation); but it is easy to visualize the demander of capital being a home purchaser, a small business, or a government unit. For example, if your uncle lends you money to help you fund a new business, a direct transfer of funds will occur. Alternatively, if you borrow money to purchase a home, you will probably raise the funds through a financial intermediary such as your local commercial bank or mortgage banker. That banker could sell your mortgage to an investment bank, which then might use it as collateral for a bond that is bought by a pension fund. In a global context, economic development is highly correlated with the level and efficiency of financial markets and institutions.<sup>1</sup> It is difficult, if not impossible, for an economy to reach its full potential if it doesn't have access to a well-functioning financial system. In a well-developed economy like that of the United States, an extensive set of markets and institutions has evolved over time to facilitate the efficient allocation of capital. To raise capital efficiently, managers must understand how these markets and institutions work; and individuals need to know how the markets and institutions work to get high rates of returns on their savings.

## FINANCIAL MARKETS

People and organizations wanting to borrow money are brought together with those who have surplus funds in the financial markets. Note that markets is plural; there are many different financial markets in a developed economy such as that of the United States. We describe some of these markets and some trends in their development.

### Types of Markets

Different financial markets serve different types of customers or different parts of the country. Financial markets also vary depending on the maturity of the securities being traded and the types of assets used to back the securities. For these reasons, it is useful to classify markets along the following dimensions:

1. Physical asset markets versus financial asset markets. Physical asset markets (also called "tangible" or "real" asset markets) are for products such as wheat, autos, real estate, computers, and machinery. Financial asset markets, on the other hand, deal with stocks, bonds, notes, and mortgages. Financial markets also deal with derivative securities whose values are derived from changes in the prices of other assets. A share of Ford stock is a "pure financial asset," while an option to buy Ford shares is a derivative security whose value depends on the price of Ford stock. The bonds backed by subprime mortgages discussed at the beginning of this chapter are another type of derivative, as the values of these bonds are derived from the values of the underlying mortgages.

2. Spot markets versus futures markets. Spot markets are markets in which assets are bought or sold for “on-the-spot” delivery (literally, within a few days). Futures markets are markets in which participants agree today to buy or sell an asset at some future date. For example, a farmer may enter into a futures contract in which he agrees today to sell 5,000 bushels of soybeans 6 months from now at a price of \$5 a bushel. To continue that example, a food processor that needs soybeans in the future may enter into a futures contract in which it agrees to buy soybeans 6 months from now. Such a transaction can reduce, or hedge, the risks faced by both the farmer and the food processor.

3. Money markets versus capital markets. Money markets are the markets for short term, highly liquid debt securities. The New York, London, and Tokyo money markets are among the world’s largest. Capital markets are the markets for intermediate- or long-term debt and corporate stocks. The New York Stock Exchange, where the stocks of the largest U.S. corporations are traded, is a prime example of a capital market. There is no hard-and-fast rule, but in a description of debt markets, short-term generally means less than 1 year, intermediate-term means 1 to 10 years, and long-term means more than 10 years.

4. Primary markets versus secondary markets. Primary markets are the markets in which corporations raise new capital. If GE were to sell a new issue of common stock to raise capital, a primary market transaction would take place. The corporation selling the newly created stock, GE, receives the proceeds from the sale in a primary market transaction. Secondary markets are markets in which existing, already outstanding securities are traded among investors. Thus, if Jane Doe decided to buy 1,000 shares of GE stock, the purchase would occur in the secondary market. The New York Stock Exchange is a secondary market because it deals in outstanding, as opposed to newly issued, stocks and bonds. Secondary markets also exist for mortgages, other types of loans, and other financial assets. The corporation whose securities are being traded is not involved in a secondary market transaction and thus does not receive funds from such a sale.

5. Private markets versus public markets. Private markets, where transactions are negotiated directly between two parties, are differentiated from public markets, where standardized contracts are traded on organized exchanges. Bank loans and private debt placements with insurance companies are examples of private market transactions. Because these transactions are private, they may be structured in any manner to which the two parties agree. By contrast, securities that are traded in public markets (for example, common stock and corporate bonds) are held by a large number of individuals. These securities must have fairly standardized contractual features because public investors do not generally have the time and expertise to negotiate unique, non-standardized contracts. Broad ownership and standardization result in publicly traded securities being more liquid than tailor-made, uniquely negotiated securities.

Other classifications could be made, but this breakdown shows that there are many types of financial markets. Also note that the distinctions among markets are often blurred and unimportant except as a general point of reference. For example, it makes little difference if a firm borrows for 11, 12, or 13 months, that is, whether the transaction is a “money” or “capital” market transaction. You should be aware of the important differences among types of markets, but don’t be overly concerned about trying to distinguish them at the boundaries. A healthy economy is dependent on efficient funds transfers from people who are net savers to firms and individuals who need capital. Without efficient transfers, the economy could not function: Carolina Power & Light could not raise capital, so Raleigh’s

citizens would have no electricity; the Johnson family would not have adequate housing; Carol Hawk would have no place to invest her savings; and so forth. Obviously, the level of employment and productivity (i.e., the standard of living) would be much lower. Therefore, it is essential that financial markets function efficiently—not only quickly, but also inexpensively.

## Recent Trends

Financial markets have experienced many changes in recent years. Technological advances in computers and telecommunications, along with the globalization of banking and commerce, have led to deregulation, which has increased competition throughout the world. As a result, there are more efficient, internationally linked markets, which are far more complex than what existed a few years ago. While these developments have been largely positive, they have also created problems for policy makers. At one conference, former Federal Reserve Board Chairperson Alan Greenspan stated that modern financial markets “expose national economies to shocks from new and unexpected sources and with little if any lag.” He went on to say that central banks must develop new ways to evaluate and limit risks to the financial system. Large amounts of capital move quickly around the world in response to changes in interest and exchange rates, and these movements can disrupt local institutions and economies. The subprime mortgage crisis discussed in the opening chapter vignette illustrates how problems in one country quickly affect the economies of other nations. Globalization has exposed the need for greater cooperation among regulators at the international level, but the task is not easy. Factors that complicate coordination include the different structures in nations’ banking and securities industries; the trend toward financial services conglomerates, which obscures developments in various market segments; and the reluctance of individual countries to give up control over their national monetary policies. Still, regulators are unanimous about the need to close the gaps in the supervision of worldwide markets. Another important trend in recent years has been the increased use of derivatives. A derivative is any security whose value is derived from the price of some other “underlying” asset. An option to buy IBM stock is a derivative, as is a contract to buy Japanese yen 6 months from now or a bond backed by subprime mortgages. The value of the IBM option depends on the price of IBM’s stock, the value of the Japanese yen “future” depends on the exchange rate between yen and dollars, and the value of the bond depends on the value of the underlying mortgages. The market for derivatives has grown faster than any other market in recent years, providing investors with new opportunities, but also exposing them to new risks. Derivatives can be used to reduce risks or to speculate. Suppose a wheat processor’s costs rise and its net income falls when the price of wheat rises. The processor could reduce its risk by purchasing derivatives—wheat futures—whose value increases when the price of wheat rises. This is a hedging operation, and its purpose is to reduce risk exposure. Speculation, on the other hand, is done in the hope of high returns; but it raises risk exposure. For example, several years ago Procter & Gamble disclosed that it lost \$150 million on derivative investments. More recently, losses on mortgage-related derivatives helped contribute to the credit collapse in 2008. The values of most derivatives are subject to more volatility than the values of the underlying assets. For example, someone might pay \$500 for an option to buy 100 shares of IBM stock at \$120 per share when the stock is selling for \$120. If the stock rose by \$5 per share, a gain of 4.17% would result. However, the options would be worth somewhere

between \$25 and \$30; so the percentage gain would be between 400% and 500%.<sup>3</sup> Of course, if IBM stayed at \$120 or fell, the options would be worthless and the option purchaser would have a 100% loss. Many other derivatives have similar characteristics and are equally as risky or even more risky. If a bank or any other company reports that it invests in derivatives, how can one tell if the derivatives are held as a hedge against something like an increase in the price of wheat or as a speculative bet that wheat prices will rise? The answer is that it is very difficult to tell how derivatives are affecting the risk profile of the firm. In the case of financial institutions, things are even more complicated—the derivatives are generally based on changes in interest rates, foreign exchange rates, or stock prices; and a large international bank might have tens of thousands of separate derivative contracts. The size and complexity of these transactions concern regulators, academics, and members of Congress. Former Fed Chairperson Greenspan noted that in theory, derivatives should allow companies to better manage risk but that it is not clear whether recent innovations have “increased or decreased the inherent stability of the financial system.”

## FINANCIAL INSTITUTIONS

Direct funds transfers are common among individuals and small businesses and in economies where financial markets and institutions are less developed. But large businesses in developed economies generally find it more efficient to enlist the services of a financial institution when it comes time to raise capital. In the United States and other developed nations, a set of highly efficient financial intermediaries has evolved. Their original roles were generally quite specific, and regulation prevented them from diversifying. However, in recent years, regulations against diversification have been largely removed; and today the differences between institutions have become blurred. Still, there remains a degree of institutional identity. Therefore, it is useful to describe the major categories of financial institutions here. Keep in mind, though, that one company can own a number of subsidiaries that engage in the different functions described next.

**1. Investment banks** traditionally help companies raise capital. They (a) help corporations design securities with features that are currently attractive to investors, (b) buy these securities from the corporation, and (c) resell them to savers. Since the investment bank generally guarantees that the firm will raise the needed capital, the investment bankers are also called underwriters. The recent credit crisis has had a dramatic effect on the investment banking industry. Bear Stearns collapsed and was later acquired by J.P. Morgan, Lehman Brothers went bankrupt, and Merrill Lynch was forced to sell out to Bank of America. Moreover, the two “surviving” major investment banks (Morgan Stanley and Goldman Sachs) received Federal Reserve approval to become commercial bank holding companies. Their future remains uncertain.

**2. Commercial banks**, such as Bank of America, Citibank, Wells Fargo, Wachovia, and JPMorgan Chase, are the traditional “department stores of finance” because they serve a variety of savers and borrowers. Historically, commercial banks were the major institutions that handled checking accounts and through which the Federal Reserve System expanded or contracted the money supply. Today, however, several other institutions also provide checking services and significantly influence the money supply. Note, too, that the larger banks are generally part of financial services corporations.

**3. Financial services** corporations are large conglomerates that combine many different financial institutions within a single corporation. Most financial services corporations started in one area but have now diversified to cover most of the financial spectrum. For example, Citigroup owns Citibank (a commercial bank), Smith Barney (an investment bank and securities brokerage organization), insurance companies, and leasing companies.

**4. Credit unions** are cooperative associations whose members are supposed to have a common bond, such as being employees of the same firm. Members' savings are loaned only to other members, generally for auto purchases, home improvement loans, and home mortgages. Credit unions are often the cheapest source of funds available to individual borrowers.

**5. Pension funds** are retirement plans funded by corporations or government agencies for their workers and administered primarily by the trust departments of commercial banks or by life insurance companies. Pension funds invest primarily in bonds, stocks, mortgages, and real estate.

**6. Life insurance companies** take savings in the form of annual premiums; invest these funds in stocks, bonds, real estate, and mortgages; and make payments to the beneficiaries of the insured parties. In recent years, life insurance companies have also offered a variety of tax-deferred savings plans designed to provide benefits to participants when they retire.

**7. Mutual funds** are corporations that accept money from savers and then use these funds to buy stocks, long-term bonds, or short-term debt instruments issued by businesses or government units. These organizations pool funds and thus reduce risks by diversification. They also achieve economies of scale in analyzing securities, managing portfolios, and buying and selling securities. Different funds are designed to meet the objectives of different types of savers. Hence, there are bond funds for those who prefer safety, stock funds for savers who are willing to accept significant risks in the hope of higher returns, and still other funds that are used as interest-bearing checking accounts (money market funds). There are literally thousands of different mutual funds with dozens of different goals and purposes.

Mutual funds have grown more rapidly than most other institutions in recent years, in large part because of a change in the way corporations provide for employees' retirement. Before the 1980s, most corporations said, in effect, "Come work for us; and when you retire, we will give you a retirement income based on the salary you were earning during the last five years before you retired." The company was then responsible for setting aside funds each year to make sure it had the money available to pay the agreed-upon retirement benefits. That situation is changing rapidly. Today new employees are likely to be told, "Come work for us, and we will give you some money each payday that you can invest for your future retirement. You can't get the money until you retire (without paying a huge tax penalty); but if you invest wisely, you can retire in comfort." Most workers recognize that they don't know how to invest wisely, so they turn their retirement funds over to a mutual fund. Hence, mutual funds are growing rapidly.

**8. Exchange Traded Funds (ETFs)** are similar to regular mutual funds and are often operated by mutual fund companies. ETFs buy a portfolio of stocks of a certain type—for example, the S&P 500 or media companies or Chinese companies—and then sell their own shares to the public. ETF shares are generally traded in the public markets, so an investor

who wants to invest in the Chinese market, for example, can buy shares in an ETF that holds stocks in that particular market.

**9. Hedge funds** are also similar to mutual funds because they accept money from savers and use the funds to buy various securities, but there are some important differences. While mutual funds (and ETFs) are registered and regulated by the Securities and Exchange Commission (SEC), hedge funds are largely unregulated. This difference in regulation stems from the fact that mutual funds typically target small investors, whereas hedge funds typically have large minimum investments (often exceeding \$1 million) and are marketed primarily to institutions and individuals with high net worth. Hedge funds received their name because they traditionally were used when an individual was trying to hedge risks. For example, a hedge fund manager who believes that interest rate differentials between corporate and Treasury bonds are too large might simultaneously buy a portfolio of corporate bonds and sell a portfolio of Treasury bonds. In this case, the portfolio would be “hedged” against overall movements in interest rates, but it would perform especially well if the spread between these securities were to narrow. However, some hedge funds take on risks that are considerably higher than that of an average individual stock or mutual fund. For example, in 1998, Long-Term Capital Management (LTCM), a high-profile hedge fund whose managers included several well-respected practitioners as well as two Nobel Prize-winning professors who were experts in investment theory, made some incorrect assumptions and “blew up.”<sup>5</sup> LTCM had many billions of dollars under management, and it owed large amounts of money to a number of banks. To avert a worldwide crisis, the Federal Reserve orchestrated a buyout of the firm by a group of New York banks. As hedge funds have become more popular, many of them have begun to lower their minimum investment requirements. Perhaps not surprisingly, their rapid growth and shift toward smaller investors have also led to a call for more regulation.

**10. Private equity** companies are organizations that operate much like hedge funds; but rather than buying some of the stock of a firm, private equity players buy and then manage entire firms. Most of the money used to buy the target companies is borrowed. Recent examples include Cerberus Capital’s buyout of Chrysler and private equity company JC Flowers’ proposed \$25 billion purchase of Sallie Mae, the largest student loan company. The Sallie Mae deal is in jeopardy—Flowers planned to borrow most of the money for the purchase, but the subprime situation has made borrowing more difficult and expensive. Flowers tried to back out of the deal, but Sallie Mae executives insisted that it complete the transaction or pay a \$900 million “breakup fee.”

## THE STOCK MARKET

As noted earlier, outstanding, previously issued securities are traded in the secondary markets. By far, the most active secondary market—and the most important one to financial managers—is the stock market, where the prices of firms’ stocks are established. Because the primary goal of financial managers is to maximize their firms’ stock prices, knowledge of the stock market is important to anyone involved in managing a business.

## THE MARKET FOR COMMON STOCK

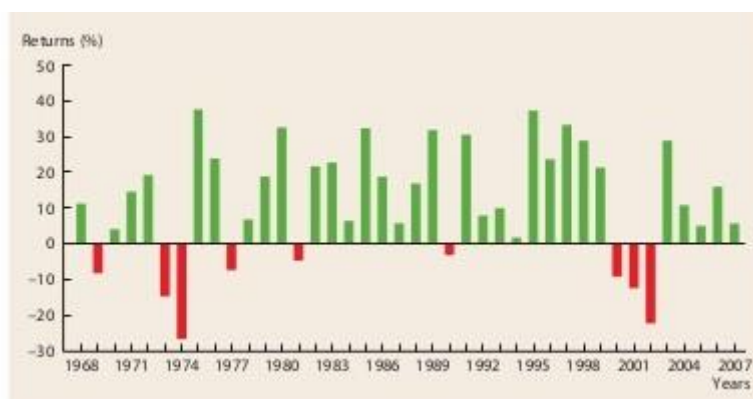
Some companies are so small that their common stocks are not actively traded; they are owned by relatively few people, usually the companies’ managers. These firms are said to

be privately owned, or closely held, corporations; and their stock is called closely held stock. In contrast, the stocks of most large companies are owned by thousands of investors, most of whom are not active in management. These companies are called publicly owned corporations, and their stock is called publicly held stock. A recent study found that institutional investors owned about 46% of all publicly held common stocks. Included are pension plans (26%), mutual funds (10%), foreign investors (6%), insurance companies (3%), and brokerage firms (1%). However, because these institutions buy and sell relatively actively, they account for about 75% of all transactions. Thus, institutional investors have a significant influence on the prices of individual stocks.

## STOCK MARKETS AND RETURNS

Anyone who has invested in the stock market knows that there can be large differences between expected and realized prices and returns. As logic would suggest, a stock's expected return as estimated by investors at the margin is always positive; otherwise, investors would not buy the stock. However, as Figure 2-2 shows, in some years, actual returns are negative.

This figure shows how total realized portfolio returns have varied from year to year:



## CHAPTER 3. WORKING CAPITAL MANAGEMENT

Best Buy Company, North America's largest consumer electronics retailer, has performed extremely well over the past decade. Its stock sold for \$50 in late 2007, up from \$2 only 10 years earlier. This excellent performance stemmed from sound financial and operating practices, especially its working capital management, the focus of this chapter. Working capital management involves finding the optimal levels for cash, marketable securities, accounts receivable, and inventory and then financing that working capital for the least cost. Most of Best Buy's customers use credit cards, so neither in-store cash nor accounts receivable is significant. Therefore, Best Buy's working capital policy focuses on its inventories. To maintain sales, its stores must be well stocked with the goods customers are seeking at the time they are shopping. This involves determining what new products are hot, determining where they can be obtained at the lowest cost, and delivering them to stores in a timely manner. Dramatic improvements in communications and computer

technology have transformed the way Best Buy manages its inventories. It now collects real-time data from each store on how each product is selling, and its computers place orders automatically to keep the shelves full. Moreover, if sales of an item are slipping, prices are lowered to reduce stocks of that item before the situation gets so bad that drastic price cuts are necessary. After studying this chapter, you will have a good understanding of how working capital should be managed so as to maximize profits and stock prices.

## BACKGROUND ON WORKING CAPITAL

The term working capital originated with the old Yankee peddler who would load up his wagon and go off to peddle his wares. The merchandise was called “working capital” because it was what he actually sold, or “turned over,” to produce his profits. The wagon and horse were his fixed assets. He generally owned the horse and wagon (so they were financed with “equity” capital), but he bought his merchandise on credit (that is, by borrowing from his supplier) or with money borrowed from a bank. Those loans were called working capital loans, and they had to be repaid after each trip to demonstrate that the peddler was solvent and worthy of a new loan. Banks that followed this procedure were said to be employing “sound banking practices.” The more trips the peddler took per year, the faster his working capital turned over and the greater his profits. We begin with a review of two basic definitions:

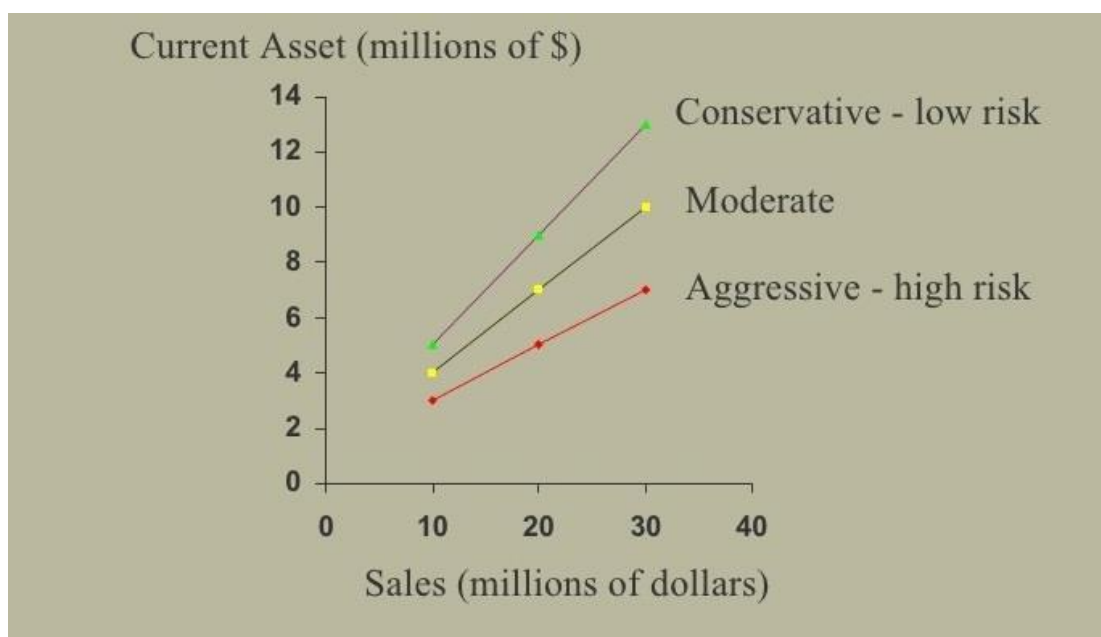
- 1. Working capital.** Current assets are often called working capital because these assets “turn over” (i.e., are used and then replaced all during the year).
- 2. Net working capital.** When a firm buys inventory on credit, its suppliers in effect lend it the money used to finance the inventory. The firm could have borrowed from its bank or sold stock to obtain the money, but it received the funds from its suppliers. These loans are recorded as accounts payable, and they are typically “free” in the sense that they do not bear interest. Similarly, Allied pays its workers every 2 weeks and pays taxes quarterly, so its labor force and the tax authorities provide it with loans equal to its accrued wages and taxes. If we subtract the sum of payables plus accruals from current assets, the difference is called net working capital, which represents the amount of money that the firm must obtain from non-free sources to carry its current assets.

## CURRENT ASSET INVESTMENT POLICIES

In this section, we discuss how the amount of current assets held affects profitability. To begin, the next figure shows three alternative policies regarding the size of current asset holdings.



## Current Asset Investment Policies (Millions of Dollars)



The top line has the steepest slope, which indicates that the firm holds a great deal of cash, marketable securities, receivables, and inventories relative to its sales. When receivables are high, the firm has a liberal credit policy, which results in a high level of accounts receivable. This is a relaxed investment policy. On the other hand, when a firm has a restricted (or tight or "lean-and-mean") investment policy, holdings of current assets are minimized. A moderate investment policy lies between the two extremes.

We can use the DuPont equation to demonstrate how working capital management affects ROE:

$$\begin{aligned} \text{ROE} &= \text{Profit margin} \times \text{Total assets turnover} \times \text{Leverage factor} \\ &= \text{Net income} / \text{Sales} \times \text{Sales} / \text{Assets} \times \text{Assets} / \text{Equity} \end{aligned}$$

A restricted (lean-and-mean) policy means a low level of assets (hence, a high total assets turnover ratio), which results in a high ROE, other things held constant. However, this policy also exposes the firm to risks because shortages can lead to work stoppages, unhappy customers, and serious long-run problems. The relaxed policy minimizes such operating problems; but it results in a low turnover, which in turn lowers ROE. The moderate policy falls between the two extremes. The optimal strategy is the one that maximizes the firm's long-run earnings and the stock's intrinsic value. Note that changing technologies can lead to changes in the optimal policy. For example, when a new technology makes it possible for a manufacturer to produce a given product in 5 rather than 10 days, work-in-progress inventories can be cut in half. Similarly, retailers such as Wal-Mart and Home Depot have inventory management systems in which bar codes on all merchandise are read at the cash register. This information is transmitted electronically to a computer that records the

remaining stock of each item, and the computer automatically places an order with the supplier's computer when the stock falls to a specified level. This process lowers the "safety stocks" that would otherwise be necessary to avoid running out of stock, which lowers inventories to profit-maximizing levels.

## **CURRENT ASSET FINANCING POLICIES**

Investments in current assets must be financed; and the primary sources of funds include bank loans, credit from suppliers (accounts payable), accrued liabilities, long-term debt, and common equity. Each of those sources has advantages and disadvantages, so each firm must decide which sources are best for it. To begin, note that most businesses experience seasonal and/or cyclical fluctuations. For example, construction firms tend to peak in the summer, retailers peak around Christmas, and the manufacturers who supply both construction companies and retailers follow related patterns. Similarly, the sales of virtually all businesses increase when the economy is strong; hence, they build up current assets at those times but let inventories and receivables fall when the economy weakens. Note, though, that current assets rarely drop to zero—companies maintain some permanent current assets, which are the current assets needed at the low point of the business cycle. Then as sales increase during an upswing, current assets are increased, and these extra current assets are defined as temporary current assets as opposed to permanent current assets. The way these two types of current assets are financed is called the firm's current assets financing policy.

## **CHAPTER 4. FINANCIAL PLANNING AND FORECASTING**

In March 2008, CEO Jeffrey Immelt announced to security analysts that GE's divisions were hitting their earnings targets and that the firm would enjoy double-digit growth for the year. According to Immelt, GE's global portfolio of businesses, which ranged from nuclear power plants to TV networks and movie studios, stabilized earnings and protected the company from economic shocks such as the subprime mortgage debacle. GE's stock responded nicely, rising from \$32 to \$38 per share. However, less than a month later Immelt held another televised news conference where he announced that GE's first-quarter earnings were down 5.8%, with similar declines likely for the rest of 2008. GE's stock plunged, lowering stockholder wealth by about \$50 billion in just one day. Immelt's announcement delivered a blow to GE's reputation and credibility. Investors set stock prices based on information and recommendations from the security analysts who work for the large investment banks and brokerages. Analysts study historical data, but they recognize that companies' managers have the best information about future earnings. Therefore, if a company is "credible" and can be trusted, analysts base their forecasts heavily on information like Immelt provided in his March forecast. Each analyst produces a "target price," which is essentially his or her estimate of the stock's intrinsic value. The brokers of the analysts' firms then use that information when they make recommendations to their customers. Immelt's initial forecast led to buy recommendations and GE purchases, but the quick retraction led to substantial losses and unhappy customers. Those customers let their brokers know how they felt, and those feelings were relayed to the analysts and then to Immelt; and he probably called some of his subordinates to task. The whole episode was

embarrassing to Immelt and to GE. GE's board must have been unhappy, which is not good for a CEO in an era when CEOs can be easily replaced. GE was founded to commercialize Thomas Edison's inventions in lightbulb and power plant technologies, but today its divisions extend far beyond its base. A number of analysts have questioned GE's diversification strategy and have argued that the company should spin off unrelated units and return to its roots. They point out that GE's stock price in 2008 is about 30% below its 2001 level; and they ask why, if the company has such a good strategic plan, its stock price has not done better. Here's the comment of one analyst, Citigroup's Jeff Sprague: "We believe the evidence is mounting that GE is too big and complex to manage effectively." Sprague and others believe that stockholders would be better served if GE was split into several smaller, more focused companies. Then each company's CEO would presumably understand his or her particular business and could focus exclusively on running it. Businesses that are related could be kept together, but unrelated ones would be spun off. If that was done, perhaps forecasting would be easier, Immelt would end up less chagrined, and GE's stockholders would be wealthier.

## STRATEGIC PLANNING

Management textbooks often list the following as the key elements of a strategic plan:

1. **Mission Statement.** Many but not all firms articulate a mission statement. GE does not have one, but it states that its chairman's letter in the annual report serves this purpose. In his letter, Jeff Immelt discusses his goals for GE's major businesses and for the firm as a whole. Not surprisingly, Immelt indicated that he wants the various businesses to achieve high growth rates, high profit margins, and high rates of return on invested capital, all with the ultimate goal of increasing GE's stock price.
2. **Corporate Scope.** Corporate scope defines the lines of business the firm plans to pursue and the geographic areas in which it will operate. Some firms deliberately limit their scope on the theory that it is better for top managers to focus sharply on a narrow range of functions as opposed to spreading the company over many different types of businesses. Academics have studied which is the better choice. Some studies suggest that investors generally value focused firms more highly than diversified ones. However, if a firm is successful in combining a group of diversified businesses so that they help one another, as GE tries to do, the result may be synergistic effects that raise the value of the overall enterprise. In any event, the stated corporate scope should be logical and consistent with the firm's capabilities.
3. **Statement of Corporate Objectives.** A firm's statement of corporate objectives is that part of the corporate plan that sets forth the specific goals that operating managers are expected to meet. Like most firms, GE has both qualitative and quantitative objectives. For example, here is a key statement from Immelt's 2006 letter to stockholders:

We expect our businesses to achieve 10% earnings growth most years, with long-term returns on equity of 20%. We expect our businesses to be industry leaders in market share, value, and profitability. GE has a history of selling off units that do not

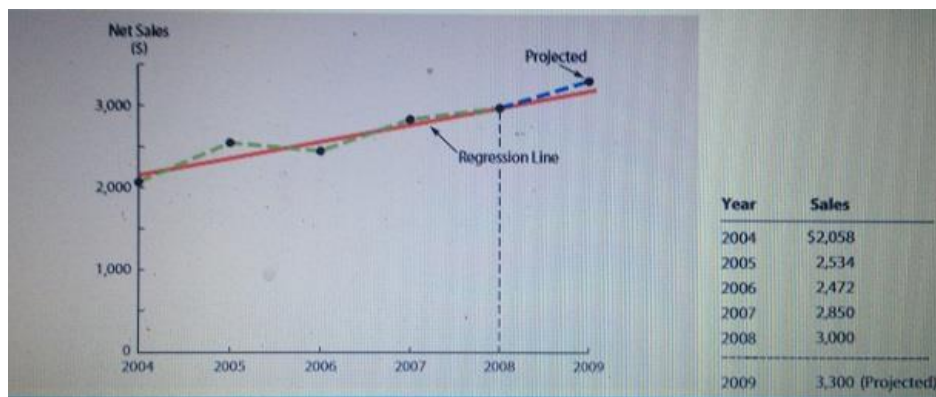
meet its objectives and of replacing underperforming managers, but GE also rewards managers generously when they meet their targets.

4. **Corporate Strategies.** GE has several broad corporate strategies. One is to be highly diversified by both products and geographic scope in order to achieve earnings stability and financial strength. Its management believes that financial strength will lead to a low cost of capital, which will benefit all its units. Also, since GE's management believes that the company should be at the forefront in addressing environmental issues, it is investing heavily in infrastructure technologies to purify air and water. Immelt expects to "do good by doing good."
5. **Operating Plan.** Each of GE's units must develop a detailed operating plan that is consistent with the corporate strategy to help it achieve the firm's objectives. Operating plans can be developed for any time horizon, but most companies use a 5-year horizon. The plan explains in considerable detail those people responsible for each particular function, deadlines for specific tasks, sales and profit targets, and the like.
6. **Financial Plan.** Financial planning is a multistep process. Allied's financial plan involves four steps. First, assumptions are made about the future levels of sales, costs, interest rates, and so forth, for use in the forecast. Second, a set of projected financial statements is developed.

Financial planning as described previously is often called "value-based management," meaning that the effects of various decisions on the firm's financial position and value are studied by simulating their effects within the firm's financial model.

## THE SALES FORECAST

Financial plans generally begin with a sales forecast, which starts with a review of sales during the past 5 years, shown as a graph above for Allied Foods. These numbers are based on Allied's financial statements. The data below the graph show 5 years of historical sales. Allied had its ups and downs from 2004 to 2008. In 2006, poor weather in California's fruit-producing regions resulted in below-average crops, which caused 2006 sales to fall below the 2005 level. Then a bumper crop in 2007 pushed sales up by 15%, an unusually high growth rate for a mature food processor. As shown in the chapter's Excel model, the compound annual growth rate over the 4-year period was 9.88%.



Due to planned new products, planned increased production, planned distribution capacity, a new advertising campaign, and other factors, management expects the growth rate to increase slightly, to 10%, in 2009. Therefore, sales should rise from \$3,000 million to \$3,300 million. Of course, management likes higher sales growth, but not at any cost. For example, sales could be increased by cutting prices, spending more on advertising, granting easier credit, and the like. However, all of those actions would have a cost. Also, sales growth cannot occur without a concurrent increase in capacity, and that too is costly. So the sales growth must be balanced against the cost of achieving that growth. If the sales forecast is off, the consequences can be serious. First, if the market expands by more than Allied expects, it will not be able to meet demand, its customers will buy from competitors, and it will lose market share. On the other hand, if its projections are overly optimistic, Allied could end up with too much plant, equipment, and inventory, leading to low turnover ratios, high costs for depreciation and storage, and write-offs of spoiled inventory. This would result in low profits and a depressed stock price. Moreover, if Allied financed its expansion with debt, high interest charges would compound the firm's problems. Finally, note that the sales forecast is the most important input in the firm's forecast of financial statements. The importance of the sales forecast is highlighted when we forecast the financial statements.

## CHOOSE THE RIGHT FORECASTING TECHNIQUE

To handle the increasing variety and complexity of managerial forecasting problems, many forecasting techniques have been developed in recent years. Each has its special use, and care must be taken to select the correct technique for a particular application. The manager as well as the forecaster has a role to play in technique selection; and the better they understand the range of forecasting possibilities, the more likely it is that a company's forecasting efforts will bear fruit.

The selection of a method depends on many factors—the context of the forecast, the relevance and availability of historical data, the degree of accuracy desirable, the time period to be forecast, the cost/ benefit (or value) of the forecast to the company, and the time available for making the analysis.

These factors must be weighed constantly, and on a variety of levels. In general, for example, the forecaster should choose a technique that makes the best use of available data. If the forecaster can readily apply one technique of acceptable accuracy, he or she should not try to "gold plate" by using a more advanced technique that offers potentially greater accuracy but that requires nonexistent information or information that is costly to obtain. This kind of trade-off is relatively easy to make, but others, as we shall see, require considerably more thought.

Furthermore, where a company wishes to forecast with reference to a particular product, it must consider the stage of the product's life cycle for which it is making the forecast. The availability of data and the possibility of establishing relationships between the factors depend directly on the maturity of a product, and hence the life-cycle stage is a prime determinant of the forecasting method to be used.

Our purpose here is to present an overview of this field by discussing the way a company ought to approach a forecasting problem, describing the methods available, and explaining how to match method to problem. We shall illustrate the use of the various techniques from

our experience with them at Corning, and then close with our own forecast for the future of forecasting.

Although we believe forecasting is still an art, we think that some of the principles which we have learned through experience may be helpful to others.

## MANAGER, FORECAST & CHOICE OF METHODS

A manager generally assumes that when asking a forecaster to prepare a specific projection, the request itself provides sufficient information for the forecaster to go to work and do the job. This is almost never true.

Successful forecasting begins with a collaboration between the manager and the forecaster, in which they work out answers to the following questions.

**1. What is the purpose of the forecast—how is it to be used?** This determines the accuracy and power required of the techniques, and hence governs selection. Deciding whether to enter a business may require only a rather gross estimate of the size of the market, whereas a forecast made for budgeting purposes should be quite accurate. The appropriate techniques differ accordingly.

Again, if the forecast is to set a “standard” against which to evaluate performance, the forecasting method should not take into account special actions, such as promotions and other marketing devices, since these are meant to change historical patterns and relationships and hence form part of the “performance” to be evaluated.

Forecasts that simply sketch what the future will be like if a company makes no significant changes in tactics and strategy are usually not good enough for planning purposes. On the other hand, if management wants a forecast of the effect that a certain marketing strategy under debate will have on sales growth, then the technique must be sophisticated enough to take explicit account of the special actions and events the strategy entails.

Techniques vary in their costs, as well as in scope and accuracy. The manager must fix the level of inaccuracy he or she can tolerate—in other words, decide how his or her decision will vary, depending on the range of accuracy of the forecast. This allows the forecaster to trade off cost against the value of accuracy in choosing a technique.

For example, in production and inventory control, increased accuracy is likely to lead to lower safety stocks. Here the manager and forecaster must weigh the cost of a more sophisticated and more expensive technique against potential savings in inventory costs.

Exhibit I shows how cost and accuracy increase with sophistication and charts this against the corresponding cost of forecasting errors, given some general assumptions. The most sophisticated technique that can be economically justified is one that falls in the region where the sum of the two costs is minimal.

**Exhibit I Cost of Forecasting Versus Cost of Inaccuracy For a Medium-Range Forecast, Given Data Availability**

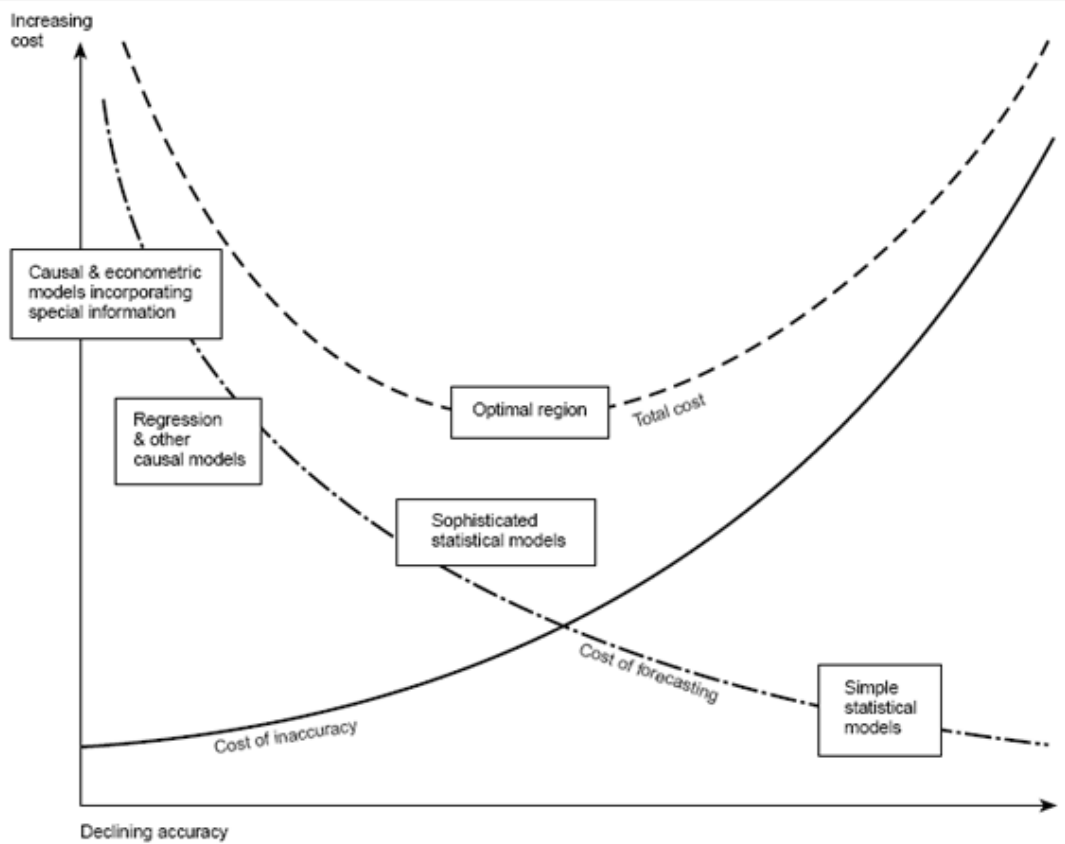


Exhibit I Cost of Forecasting Versus Cost of Inaccuracy for a Medium-Range Forecast

Once the manager has defined the purpose of the forecast, the forecaster can advise the manager on how often it could usefully be produced. From a strategic point of view, they should discuss whether the decision to be made on the basis of the forecast can be changed later, if they find the forecast was inaccurate. If it can be changed, they should then discuss the usefulness of installing a system to track the accuracy of the forecast and the kind of tracking system that is appropriate.

**2. What are the dynamics and components of the system for which the forecast will be made?** This clarifies the relationships of interacting variables. Generally, the manager and the forecaster must review a flow chart that shows the relative positions of the different elements of the distribution system, sales system, production system, or whatever is being studied.

Exhibit II displays these elements for the system through which CGW's major component for color TV sets—the bulb—flows to the consumer. Note the points where inventories are required or maintained in this manufacturing and distribution system—these are the pipeline elements, which exert important effects throughout the flow system and hence are of critical interest to the forecaster.

**Exhibit II Flow Chart of TV Distribution System**

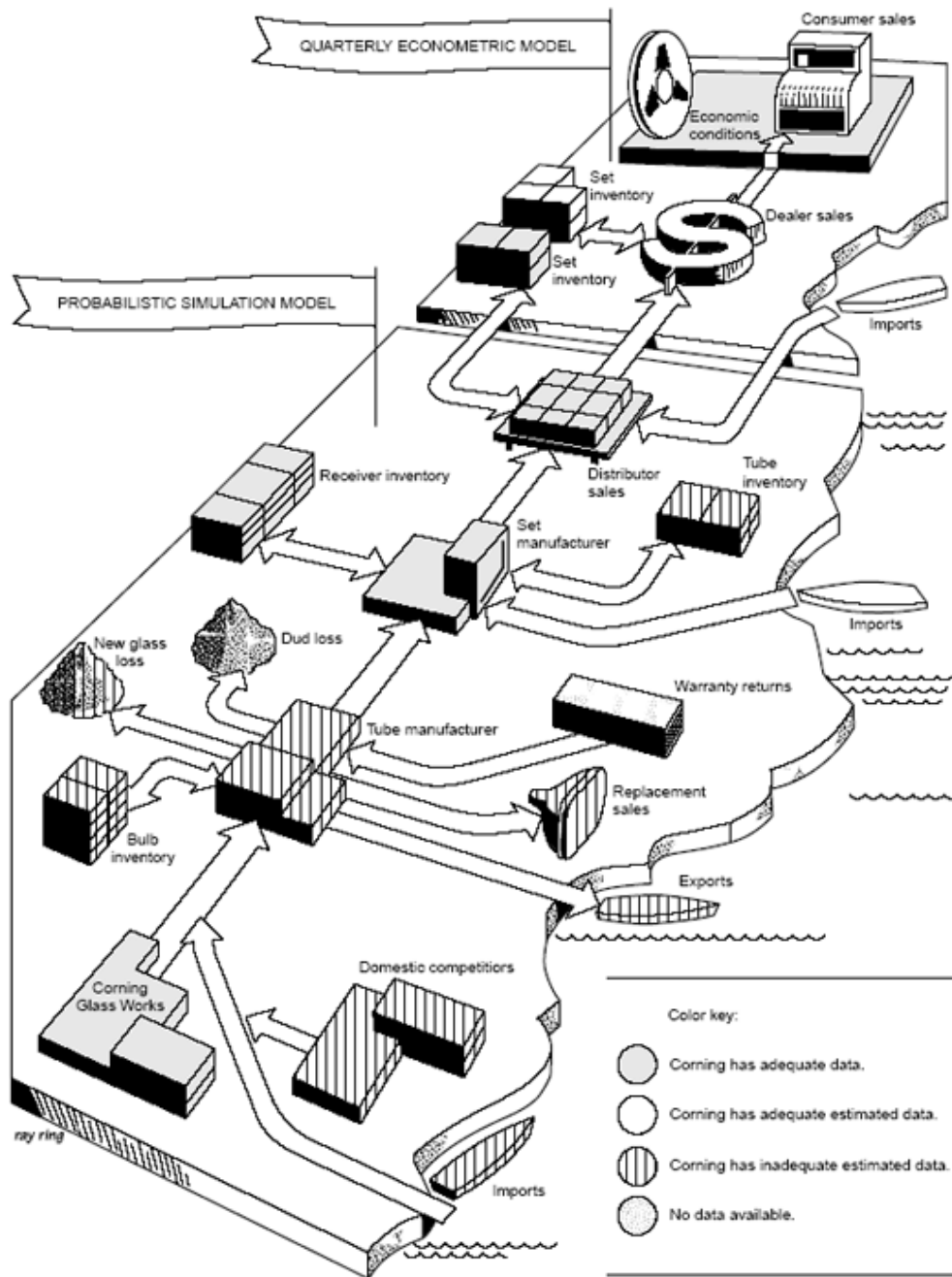


Exhibit II Flow Chart of TV Distribution System

All the elements in dark gray directly affect forecasting procedure to some extent, and the color key suggests the nature of CGW's data at each point, again a prime determinant of technique selection since different techniques require different kinds of inputs. Where data are unavailable or costly to obtain, the range of forecasting choices is limited.

The flow chart should also show which parts of the system are under the control of the company doing the forecasting. In Exhibit II, this is merely the volume of glass panels and funnels supplied by Corning to the tube manufacturers.



In the part of the system where the company has total control, management tends to be tuned in to the various cause-and-effect relationships, and hence can frequently use forecasting techniques that take causal factors explicitly into account.

The flow chart has special value for the forecaster where causal prediction methods are called for because it enables him or her to conjecture about the possible variations in sales levels caused by inventories and the like, and to determine which factors must be considered by the technique to provide the executive with a forecast of acceptable accuracy.

Once these factors and their relationships have been clarified, the forecaster can build a causal model of the system which captures both the facts and the logic of the situation—which is, after all, the basis of sophisticated forecasting.

**3. How important is the past in estimating the future?** Significant changes in the system—new products, new competitive strategies, and so forth—diminish the similarity of past and future. Over the short term, recent changes are unlikely to cause overall patterns to alter, but over the long term their effects are likely to increase. The executive and the forecaster must discuss these fully.

### THREE GENERAL TYPES

Once the manager and the forecaster have formulated their problem, the forecaster will be in a position to choose a method.

There are three basic types—qualitative techniques, time series analysis and projection, and causal models. The first uses qualitative data (expert opinion, for example) and information about special events of the kind already mentioned, and may or may not take the past into consideration.

The second, on the other hand, focuses entirely on patterns and pattern changes, and thus relies entirely on historical data.

The third uses highly refined and specific information about relationships between system elements, and is powerful enough to take special events formally into account. As with time series analysis and projection techniques, the past is important to causal models.

These differences imply (quite correctly) that the same type of forecasting technique is not appropriate to forecast sales, say, at all stages of the life cycle of a product—for example, a technique that relies on historical data would not be useful in forecasting the future of a totally new product that has no history.

The major part of the balance of this article will be concerned with the problem of suiting the technique to the life-cycle stages. We hope to give the executive insight into the potential of forecasting by showing how this problem is to be approached. But before we discuss the life cycle, we need to sketch the general functions of the three basic types of techniques in a bit more detail.

## QUALITATIVE TECHNIQUES

Primarily, these are used when data are scarce—for example, when a product is first introduced into a market. They use human judgment and rating schemes to turn qualitative information into quantitative estimates.

The objective here is to bring together in a logical, unbiased, and systematic way all information and judgments which relate to the factors being estimated. Such techniques are frequently used in new-technology areas, where development of a product idea may require several “inventions,” so that R&D demands are difficult to estimate, and where market acceptance and penetration rates are highly uncertain.

The multi-page chart “Basic Forecasting Techniques” presents several examples of this type (see the first section), including market research and the now-familiar Delphi technique.<sup>1</sup> In this chart we have tried to provide a body of basic information about the main kinds of forecasting techniques. Some of the techniques listed are not in reality a single method or model, but a whole family. Thus our statements may not accurately describe all the variations of a technique and should rather be interpreted as descriptive of the basic concept of each.

## BASIC FORECASTING TECHNIQUES

Technique	A. Qualitative Methods		
	1. Delphi Method	2. Market Research	3. Panel Consensus
Description	A panel of experts is interrogated by a sequence of questionnaires in which the responses to one questionnaire are used to produce the next questionnaire. Any set of information available to some experts and not others is thus passed on to the others, enabling all the experts to have access to all the information for forecasting. This technique eliminates the bandwagon effect of majority opinion.	The systematic, formal, and conscious procedure for evolving and testing hypotheses about real markets.	This technique is based on the assumption that several experts can arrive at a better forecast than one person. There is no secrecy, and communication is encouraged. The forecasts are sometimes influenced by social factors, and may not reflect a true consensus.
Accuracy			
Short term (0-3 months)	Fair to very good	Excellent	Poor to fair
Medium term (3 months-2 years)	Fair to very good	Good	Poor to fair
Long term (2 years & up)	Fair to very good	Fair to good	Poor
Identification of turning points	Fair to good	Fair to very good	Poor to fair
Typical applications	Forecasts of long-range and new-product sales, forecasts of margins.	Forecasts of long-range and new-product sales, forecasts of margins.	Forecasts of long-range and new-product sales, forecasts of margins.
Data required	A coordinator issues the sequence of questionnaires, editing and consolidating the responses.	As a minimum, two sets of reports over time. One needs a considerable collection of market data from questionnaires, surveys, and time series analyses of market variables.	Information from a panel of experts is presented openly in group meetings to arrive at a consensus forecast. Again, a minimum is two sets of reports over time.
Cost of forecasting*			
With a computer	\$2,000+	\$5,000+	\$1,000+
Is calculation possible without a computer?	Yes	Yes	Yes
Time required to develop an application & make a forecast	2 months+	3 months+	2 weeks +
References	North & Pyke, "Probes of the Technological Future," HBR May-June 1969, p. 68.	Bass, King & Pessemeier, <i>Applications of the Sciences in Marketing Management</i> (New York, John Wiley & Sons, Inc., 1968).	_____

\*These estimates are based on our own experience, using this machine configuration: an IBM 360-40, 256 K system and a Univac 1108 Time-sharing System, together with such smaller equipment as GE Time-sharing and IBM 360-30's and 1130's.

A. Qualitative Methods (continued)		B. Time Series Analysis & Projection	
4. Visionary Forecast	5. Historical Analogy	1. Moving Average	2. Exponential Smoothing
A prophecy that uses personal insights, judgment, and, when possible, facts about different scenarios of the future. It is characterized by subjective guesswork and imagination; in general, the methods used are non-scientific.	This is a comparative analysis of the introduction and growth of similar new products that bases the forecast on similarity patterns.	Each point of a moving average of a time series is the arithmetic or weighted average of a number of consecutive points of the series, where the number of data points is chosen so that the effects of seasonals or irregularity or both are eliminated.	This technique is similar to the moving average, except that more recent data points are given more weight. Descriptively, the new forecast is equal to the old one plus some proportion of the past forecasting error. Adaptive forecasting is somewhat the same except that seasonals are also computed. There are many variations of exponential smoothing: some are more versatile than others, some are computationally more complex, some require more computer time.
Poor Poor	Poor Good to fair	Poor to good Poor	Fair to very good Poor to good
Poor	Good to fair	Very poor	Very poor
Poor	Poor to fair	Poor	Poor
Forecasts of long-range and new-product sales, forecasts of margins.	Forecasts of long-range and new-product sales, forecasts of margins.	Inventory control for low-volume items.	Production and inventory control, forecasts of margins and other financial data.
A set of possible scenarios about the future prepared by a few experts in light of past events.	Several years' history of one or more products.	A minimum of two years of sales history, if seasonals are present. Otherwise, less data. (Of course, the more history the better.) The moving average must be specified.	The same as for a moving average.
\$100+ Yes	\$1,000+ Yes	\$.005 Yes	\$.005 Yes
1 week+	1 month+	1 day-	1 day-
—————	Spencer, Clark & Hoguet, <i>Business &amp; Economic Forecasting</i> (Homewood, Illinois, Richard D. Irwin, Inc., 1961).	Hadley, <i>Introduction to Business Statistics</i> (San Francisco, Holden-Day, Inc., 1968).	Brown, "Less Risk in Inventory Estimates," HBR July-August 1959, p. 104.

**BASIC FORECASTING TECHNIQUES (continued)**

Technique	B. Time Series Analysis & Projection (continued)		
	3. Box-Jenkins	4. X-11	5. Trend Projections
Description	Exponential smoothing is a special case of the Box-Jenkins technique. The time series is fitted with a mathematical model that is optimal in the sense that it assigns smaller errors to history than any other model. The type of model must be identified and the parameters then estimated. This is apparently the most accurate statistical routine presently available but also one of the most costly and time-consuming ones.	Developed by Julius Shiskin of the Census Bureau, this technique decomposes a time series into seasonals, trend cycles, and irregular elements. Primarily used for detailed time series analysis (including estimating seasonals); but we have extended its uses to forecasting and tracking and warning by incorporating other analytical methods. Used with special knowledge, it is perhaps the most effective technique for medium-range forecasting—three months to one year—allowing one to predict turning points and to time special events.	This technique fits a trend line to a mathematical equation and then projects it into the future by means of this equation. There are several variations: the slope-characteristic method, polynomials, logarithms, and so on.
Accuracy	Short term (0–3 months) Medium term (3 months–2 years) Long term (2 years & up)	Very good to excellent Good Very poor	Very good Good Good
Identification of turning points	Fair	Very good	Poor
Typical applications	Production and inventory control for large-volume items, forecasts of cash balances.	Tracking and warning, forecasts of company, division, or department sales.	New-product forecasts (particularly intermediate- and long-term).
Data required	The same as for a moving average. However, in this case more history is very advantageous in model identification.	A minimum of three years' history to start. Thereafter, the complete history.	Varies with the technique used. However, a good rule of thumb is to use a minimum of five years' annual data to start. Thereafter, the complete history.
Cost of forecasting* With a computer Is calculation possible without a computer?	\$10.00 Yes	\$10.00 No	Varies with application Yes
Time required to develop an application & make a forecast	1–2 days	1 day	1 day –
References	Box-Jenkins, <i>Time Series Analysis, Forecasting &amp; Control</i> (San Francisco, Holden-Day, Inc., 1970).	McLaughlin & Boyle, "Time Series Forecasting," American Marketing Association Booklet, 1962, Marketing Research Technique Series No. 6.	Hadley, <i>Introduction to Business Statistics</i> (San Francisco, Holden-Day, Inc., 1968); Oliver & Boyd, "Techniques of Production Control," Imperial Chemical Industries, 1964.

\*These estimates are based on our own experience, using this machine configuration: an IBM 360-40, 256 K system and a Univac 1108 Time-sharing System, together with such smaller equipment as GE Time-sharing and IBM 360-30's and 1130's.

<b>C. Causal Methods</b>			
<b>1. Regression Model</b>	<b>2. Econometric Model</b>	<b>3. Intention-to-Buy &amp; Anticipations Surveys</b>	<b>4. Input-Output Model</b>
This functionally relates sales to other economic, competitive, or internal variables and estimates an equation using the least-squares technique. Relationships are primarily analyzed statistically, although any relationship should be selected for testing on a rational ground.	An econometric model is a system of interdependent regression equations that describes some sector of economic sales or profit activity. The parameters of the regression equations are usually estimated simultaneously. As a rule, these models are relatively expensive to develop and can easily cost between \$5,000 and \$10,000, depending on detail. However, due to the system of equations inherent in such models, they will better express the causalities involved than an ordinary regression equation and hence will predict turning points more accurately.	These surveys of the general public (a) determine intentions to buy certain products or (b) derive an index that measures general feeling about the present and the future and estimates how this feeling will affect buying habits. These approaches to forecasting are more useful for tracking and warning than forecasting. The basic problem in using them is that a turning point may be signaled incorrectly (and hence never occur).	A method of analysis concerned with the interindustry of interdepartmental flow of goods or services in the economy or a company and its markets. It shows what flows of inputs must occur to obtain certain outputs. Considerable effort must be expended to use these models properly, and additional detail, not normally available, must be obtained if they are to be applied to specific businesses. Corporations using input-output models have expended as much as \$100,000 and more annually to develop useful applications.
Good to very good Good to very good	Good to very good Very good to excellent	Poor to good Poor to good	Not applicable Good to very good
Poor	Good	Very poor	Good to very good
Very good	Excellent	Good	Fair
Forecasts of sales by product classes, forecasts of margins.	Forecasts of sales by product classes, forecasts of margins.	Forecasts of sales by product class.	Forecasts of company sales and division sales for industrial sectors and subsectors.
Several years' quarterly history to obtain good, meaningful relationships. Mathematically necessary to have two more observations than there are independent variables.	The same as for regression.	Several years' data are usually required to relate such indexes to company sales.	Ten or fifteen years' history. Considerable amounts of information on product and service flows within a corporation (or economy) for each year for which an input-output analysis is desired.
\$100 Yes	\$5,000+ Yes	\$5,000+ Yes	\$50,000+ No
Depends on ability to identify relationships.	2 months+	Several weeks	6 months+
Clelland, de Cani, Brown, Bush & Murray, <i>Basic Statistics with Business Applications</i> (New York, John Wiley & Sons, Inc., 1966).	Evans, <i>Macro-economic Activity: Theory, Forecasting &amp; Control</i> (New York, Harper & Row Publishers, Inc., 1969).	Publications of Survey Research Center, Institute for Social Research, University of Michigan; and of Bureau of the Census.	Leontief, <i>Input-Output Economics</i> (New York, Oxford University Press, 1966).

**BASIC FORECASTING TECHNIQUES (continued)**

Technique	C. Causal Methods (continued)			
	5. Economic Input-Output Model	6. Diffusion Index	7. Leading Indicator	8. Life-Cycle Analysis
Description	Econometric models and input-output models are sometimes combined for forecasting. The input-output model is used to provide long-term trends for the econometric model; it also stabilizes the econometric model.	The percentage of a group of economic indicators that are going up or down, this percentage then becoming the index.	A time series of an economic activity whose movement in a given direction precedes the movement of some other time series in the same direction is a leading indicator.	This is an analysis and forecasting of new-product growth rates based on S-curves. The phases of product acceptance by the various groups such as innovators, early adapters, early majority, late majority, and laggards are central to the analysis.
Accuracy	Short term (0-3 months) Medium term (3 months-2 years) Long term (2 years & up)	Not applicable Good to very good	Poor to good Poor to good	Poor Poor to good
Identification of turning points	Good to excellent	Very poor	Very poor	Poor to good
Typical applications	Good	Good	Good	Poor to good
Typical applications	Company sales for industrial sectors and subsectors.	Forecasts of sales by product class.	Forecasts of sales by product class.	Forecasts of new-product sales.
Data required	The same as for a moving average and X-11.	The same as an intention-to-buy survey.	The same as an intention-to-buy survey + 5 to 10 years' history.	As a minimum, the annual sales of the product being considered or of a similar product. It is often necessary to do market surveys.
*Cost of forecasting	With a computer Is calculation possible without a computer?	\$100,000 No	\$1,000 Yes	\$1,000 Yes
Time required to develop an application & make a forecast	6 months+	1 month+	1 month+	1 month+
References	Evans & Preston, "Discussion Paper #138," Wharton School of Finance & Commerce, The University of Pennsylvania.	Evans, <i>Macro-economic Activity: Theory, Forecasting &amp; Control</i> (New York, Harper & Row Publishers, Inc., 1969).	Evans, <i>Macro-economic Activity: Theory, Forecasting &amp; Control</i> (New York, Harper & Row Publishers, Inc., 1969).	Bass, "A New Product Growth Model for Consumer Durables," <i>Management Science</i> , January 1969.

\*These estimates are based on our own experience, using this machine configuration: an IBM 360-40, 256 K system and a Univac 1108 Time-sharing System, together with such smaller equipment as GE Time-sharing and IBM 360-30's and 1130's.

A disclaimer about estimates in the chart is also in order. Estimates of costs are approximate, as are computation times, accuracy ratings, and ratings for turning-point identification. The costs of some procedures depend on whether they are being used routinely or are set up for a single forecast; also, if weightings or seasonal have to be determined anew each time a forecast is made, costs increase significantly. Still, the figures we present may serve as general guidelines.

## TIME SERIES ANALYSIS

These are statistical techniques used when several years' data for a product or product line are available and when relationships and trends are both clear and relatively stable.

One of the basic principles of statistical forecasting—indeed, of all forecasting when historical data are available—is that the forecaster should use the data on past performance to get a “speedometer reading” of the current rate (of sales, say) and of how fast this rate is increasing or decreasing. The current rate and changes in the rate—“acceleration” and “deceleration”—constitute the basis of forecasting. Once they are known, various mathematical techniques can develop projections from them.

The matter is not as simple as it sounds, however. It is usually difficult to make projections from raw data since the rates and trends are not immediately obvious; they are mixed up with seasonal variations, for example, and perhaps distorted by such factors as the effects of a large sales promotion campaign. The raw data must be massaged before they are usable, and this is frequently done by time series analysis.

Now, a time series is a set of chronologically ordered points of raw data—for example, a division's sales of a given product, by month, for several years. Time series analysis helps to identify and explain:

- Any regularity or systematic variation in the series of data which is due to seasonality—the “seasonal.”
- Cyclical patterns that repeat any two or three years or more.
- Trends in the data.
- Growth rates of these trends.

(Unfortunately, most existing methods identify only the seasonal, the combined effect of trends and cycles, and the irregular, or chance, component. That is, they do not separate trends from cycles. We shall return to this point when we discuss time series analysis in the final stages of product maturity.)

Once the analysis is complete, the work of projecting future sales (or whatever) can begin.

We should note that while we have separated analysis from projection here for purposes of explanation, most statistical forecasting techniques actually combine both functions in a single operation.

## CASUAL MODELS

When historical data are available and enough analysis has been performed to spell out explicitly the relationships between the factor to be forecast and other factors (such as related businesses, economic forces, and socioeconomic factors), the forecaster often constructs a causal model.

A causal model is the most sophisticated kind of forecasting tool. It expresses mathematically the relevant causal relationships, and may include pipeline considerations



(i.e., inventories) and market survey information. It may also directly incorporate the results of a time series analysis.

The causal model takes into account everything known of the dynamics of the flow system and utilizes predictions of related events such as competitive actions, strikes, and promotions. If the data are available, the model generally includes factors for each location in the flow chart (as illustrated in Exhibit II) and connects these by equations to describe overall product flow.

If certain kinds of data are lacking, initially it may be necessary to make assumptions about some of the relationships and then track what is happening to determine if the assumptions are true. Typically, a causal model is continually revised as more knowledge about the system becomes available.

Again, see the gatefold for a rundown on the most common types of causal techniques. As the chart shows, causal models are by far the best for predicting turning points and preparing long-range forecasts.

### METHODS, PRODUCTS & THE LIFE CYCLE

At each stage of the life of a product, from conception to steady-state sales, the decisions that management must make are characteristically quite different, and they require different kinds of information as a base. The forecasting techniques that provide these sets of information differ analogously. Exhibit III summarizes the life stages of a product, the typical decisions made at each, and the main forecasting techniques suitable at each

**Exhibit III Types of Decisions Made Over a Product's Life Cycle, with Related Forecasting Techniques**

Stage of life cycle	Product development	Market testing & early introduction	Rapid growth	Steady state
Typical decisions	Amount of development effort Product design Business strategies	Optimum facility size Marketing strategies, including distribution & pricing	Facilities expansion Marketing strategies Production planning Sales	Promotions, specials Pricing Production planning Inventories
Forecasting techniques	Delphi method Historical analysis of comparable products Priority pattern analysis Input-output analysis Panel consensus	Consumer surveys Tracking & warning systems Market tests Experimental designs	Statistical techniques for identifying turning points Tracking & warning systems Market surveys Intention-to-buy surveys	Time series analysis & projection Causal & econometric models Market surveys for tracking & warning Life-cycle analysis

Exhibit III Types of Decisions Made over a Product's Life Cycle, with Related Forecasting Techniques.

Equally, different products may require different kinds of forecasting. Two CGW products that have been handled quite differently are the major glass components for color TV tubes, of which Corning is a prime supplier, and Corning Ware cookware, a proprietary consumer product line. We shall trace the forecasting methods used at each of the four different stages of maturity of these products to give some firsthand insight into the choice and application of some of the major techniques available today.

Before we begin, let us note how the situations differ for the two kinds of products:

- For a consumer product like the cookware, the manufacturer's control of the distribution pipeline extends at least through the distributor level. Thus the manufacturer can effect or control consumer sales quite directly, as well as directly control some of the pipeline elements.  
Many of the changes in shipment rates and in overall profitability are therefore due to actions taken by manufacturers themselves. Tactical decisions on promotions, specials, and pricing are usually at their discretion as well. The technique selected by the forecaster for projecting sales therefore should permit incorporation of such "special information." One may have to start with simple techniques and work up to more sophisticated ones that embrace such possibilities, but the final goal is there.
- Where the manager's company supplies a component to an OEM, as Corning does for tube manufacturers, the company does not have such direct influence or control over either the pipeline elements or final consumer sales. It may be impossible for the company to obtain good information about what is taking place at points further along the flow system (as in the upper segment of Exhibit II), and, in consequence, the forecaster will necessarily be using a different genre of forecasting from what is used for a consumer product.

Between these two examples, our discussion will embrace nearly the whole range of forecasting techniques. As necessary, however, we shall touch on other products and other forecasting methods.

### **1. Product Development**

In the early stages of product development, the manager wants answers to questions such as these:

- What are the alternative growth opportunities to pursuing product X?
- How have established products similar to X fared?
- Should we enter this business; and if so, in what segments?
- How should we allocate R&D efforts and funds?
- How successful will different product concepts be?
- How will product X fit into the markets five or ten years from now?

Forecasts that help to answer these long-range questions must necessarily have long horizons themselves.

A common objection to much long-range forecasting is that it is virtually impossible to predict with accuracy what will happen several years into the future. We agree that uncertainty increases when a forecast is made for a period more than two years out. However, at the very least, the forecast and a measure of its accuracy enable the manager to know the risks in pursuing a selected strategy and in this knowledge

to choose an appropriate strategy from those available. Systematic market research is, of course, a mainstay in this area. For example, priority pattern analysis can describe consumers' preferences and the likelihood they will buy a product, and thus is of great value in forecasting (and updating) penetration levels and rates. But there are other tools as well, depending on the state of the market and the product concept.

## **2. Testing & Introduction**

Before a product can enter its (hopefully) rapid penetration stage, the market potential must be tested out and the product must be introduced—and then more market testing may be advisable. At this stage, management needs answers to these questions:

- What shall our marketing plan be—which markets should we enter and with what production quantities?
- How much manufacturing capacity will the early production stages require?
- As demand grows, where should we build this capacity?
- How shall we allocate our R&D resources over time?

Significant profits depend on finding the right answers, and it is therefore economically feasible to expend relatively large amounts of effort and money on obtaining good forecasts, short-, medium-, and long-range.

A sales forecast at this stage should provide three points of information: the date when rapid sales will begin, the rate of market penetration during the rapid-sales stage, and the ultimate level of penetration, or sales rate, during the steady-state stage.

## **3. Rapid Growth**

When a product enters this stage, the most important decisions relate to facilities expansion. These decisions generally involve the largest expenditures in the cycle (excepting major R&D decisions), and commensurate forecasting and tracking efforts are justified.

Forecasting and tracking must provide the executive with three kinds of data at this juncture:

- Firm verification of the rapid-growth rate forecast made previously.
- A hard date when sales will level to "normal," steady-state growth.
- For component products, the deviation in the growth curve that may be caused by characteristic conditions along the pipeline—for example, inventory blockages.

## **4. Steady State**

The decisions the manager at this stage are quite different from those made earlier. Most of the facilities planning has been squared away, and trends and growth rates have become reasonably stable. It is possible that swings in demand and profit will occur because of changing economic conditions, new and competitive products,

pipeline dynamics, and so on, and the manager will have to maintain the tracking activities and even introduce new ones. However, by and large, the manager will concentrate forecasting attention on these areas:

- Long- and short-term production planning.
- Setting standards to check the effectiveness of marketing strategies.
- Projections designed to aid profit planning.

The manager will also need a good tracking and warning system to identify significantly declining demand for the product (but hopefully that is a long way off). To be sure, the manager will want margin and profit projection and long-range forecasts to assist planning at the corporate level. However, short- and medium-term sales forecasts are basic to these more elaborate undertakings, and we shall concentrate on sales forecasts.

### **FORECASTING IN THE FUTURE**

In concluding, it is appropriate that we make a prediction about the techniques that will be used in the short- and long-term future.

As we have already said, it is not too difficult to forecast the immediate future, since long-term trends do not change overnight. Many of the techniques described are only in the early stages of application, but still we expect most of the techniques that will be used in the next five years to be the ones discussed here, perhaps in extended form.

The costs of using these techniques will be reduced significantly; this will enhance their implementation. We expect that computer timesharing companies will offer access, at nominal cost, to input-output data banks, broken down into more business segments than are available today. The continuing declining trend in computer cost per computation, along with computational simplifications, will make techniques such as the Box-Jenkins method economically feasible, even for some inventory-control applications. Computer software packages for the statistical techniques and some general models will also become available at a nominal cost.

At the present time, most short-term forecasting uses only statistical methods, with little qualitative information. Where qualitative information is used, it is only used in an external way and is not directly incorporated into the computational routine. We predict a change to total forecasting systems, where several techniques are tied together, along with a systematic handling of qualitative information.

Econometric models will be utilized more extensively in the next five years, with most large companies developing and refining econometric models of their major businesses. Marketing simulation models for new products will also be developed for the larger-volume products, with tracking systems for updating the models and their parameters. Heuristic programming will provide a means of refining forecasting models.

While some companies have already developed their own input-output models in tandem with the government input-output data and statistical projections, it will be another five to ten years before input-output models are effectively used by most major corporations.

Within five years, however, we shall see extensive use of person-machine systems, where statistical, causal, and econometric models are programmed on computers, and people interacting frequently. As we gain confidence in such systems, so that there is less exception reporting, human intervention will decrease. Basically, computerized models will do the sophisticated computations, and people will serve more as generators of ideas and developers of systems. For example, we will study market dynamics and establish more complex relationships between the factor being forecast and those of the forecasting system.

Further out, consumer simulation models will become commonplace. The models will predict the behavior of consumers and forecast their reactions to various marketing strategies such as pricing, promotions, new product introductions, and competitive actions. Probabilistic models will be used frequently in the forecasting process.

Finally, most computerized forecasting will relate to the analytical techniques described in this article. Computer applications will be mostly in established and stable product businesses. Although the forecasting techniques have thus far been used primarily for sales forecasting, they will be applied increasingly to forecasting margins, capital expenditures, and other important factors. This will free the forecaster to spend most of the time forecasting sales and profits of new products. Doubtless, new analytical techniques will be developed for new-product forecasting, but there will be a continuing problem, for at least 10 to 20 years and probably much longer, in accurately forecasting various new-product factors, such as sales, profitability, and length of life cycle.

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