

DEPARTMENT OF COMMERCE

HERBERT HOOVER, SECRETARY

U.S. BUREAU OF THE CENSUS,

W. M. STEUART, *Director*

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# HOW TO USE CURRENT BUSINESS STATISTICS

PREPARED BY

MORTIMER B. LANE

*Editor, Survey of Current Business*



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## LETTER OF TRANSMITTAL

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DEPARTMENT OF COMMERCE,  
BUREAU OF THE CENSUS,  
*Washington, February 1, 1928.*

SIR: There is transmitted herewith a bulletin on the use of current business statistics prepared by Mortimer B. Lane, editor of the *Survey of Current Business*. This booklet has been compiled in response to the demand from business executives for a handbook describing how business men can make the best use of current statistics.

The use of current business statistics is so widespread and varied that a description of methods must draw its materials from many sources. While a large number of the instances mentioned in this booklet have been gathered at different times from individual firms and trade associations, the bulk of them were secured through a questionnaire to readers of the *Survey of Current Business* and from a compendium of the Chamber of Commerce of the United States.

The manuscript has been read and criticized by the following representative business men and economists, whose cooperation is gratefully acknowledged:

Julius H. Barnes, former president, Chamber of Commerce of the United States.

Melvin T. Copeland, professor of marketing, Harvard Graduate School of Business Administration.

Ernest F. Du Brul, general manager, National Machine Tool Builders' Association.

F. M. Feiker, managing director, Associated Business Papers.

L. S. Horner, president, Niles-Bement-Pond Co.

Virgil Jordan, economist, National Industrial Conference Board.

Jurgen Kuczynski, statistician, American Federation of Labor.

E. E. Lincoln, statistician, International Telephone & Telegraph Co.

E. W. McCullough, manager, department of manufacture, Chamber of Commerce of the United States.

Wesley C. Mitchell, director, National Bureau of Economic Research

George C. Paterson, George H. McFadden & Bro.

Herbert E. Peabody, director, National Textile Research Office.

Robert R. Updegraff, associate editor, A. W. Shaw Co.

Theodore F. Whitmarsh, president, F. H. Leggett & Co.

Clarence M. Woolley, chairman of the board, American Radiator Co.

Paul Wooton, McGraw-Hill Co.

Acknowledgment is also made to the many trade associations and other organizations which have supplied instances of the use of business statistics.

Respectfully,

WILLIAM M. STEUART,  
*Director of the Census.*

HON. HERBERT HOOVER,  
*Secretary of Commerce.*

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## FOREWORD

The past five years have been remarkable for generally sustained prosperity, without the violent fluctuations which have characterized most of the previous periods of great activity. In large measure this has been due to greater knowledge of the current facts of business and a growing experience in utilizing this knowledge.

The small business man particularly has been benefited through the use of current statistics, fathered through the collective action of each industry. In this way he has at his command the resources and knowledge of business facts which alone he could not hope to secure. This knowledge has helped him to stabilize his business in spite of the intense competition and the lowering price levels of the past few years.

Mr. Lane has assembled a mass of experience of business men in guiding their companies with profit by statistical knowledge instead of guesswork. This volume quotes 283 instances of the sort. The Department of Commerce in giving wider currency to this experience hopes to contribute to the further stabilization of the business community.

HERBERT HOOVER.

# I

## THE PROBLEM AND ITS SOLUTION

**SUMMARY.**—The business man must have information on the trend of business conditions in order to base his policies on facts instead of guesswork. Current business statistics have provided these facts and have enabled large savings to be made by many companies.

Statistics are a natural development of the growth of business and of the need for greater knowledge of all phases of our national life. Current figures, begun in a small way before the World War, increased in volume to show industrial conditions for war work. After the experiences of 1920 and 1921, trade statistics grew at a still greater rate to provide facts to the various industries.

Business statistics have helped to mitigate the fluctuations in business, commonly termed the business cycle. Budgeting, based on statistics, has enabled firms to stabilize their business and secure greater profits. Business leaders state that large benefits are derived from current statistics.

Predictions from statistics are not always right, because of inaccurate or incomplete data, inadequate previous experience or lack of knowledge of the industry, but interpretations are becoming better in the light of more experience. Statistics are as vital to business as is the compass to the mariner.

“How is business?” This is the question that most business men have on the tips of their tongues, for on its answer depends whether they will raise or lower prices, increase or decrease production, purchase far ahead or only for current needs, expand or liquidate stocks, buy or sell equipment, increase or decrease advertising, as well as many other policies of prime importance in the conduct of their business. The very recurrence of this question, “How is business?”—in the office or in the factory, at lunch or at the club, on the train or on the street corner—testifies to its importance in the conduct of every business as well as to the difficulty of securing a correct answer.

Until recently the average business man, in his quest for information as to the trend of conditions, sought out other business men in order to check up on his own opinions and the showing of his company, for he realized that the figures of his own company were not necessarily representative of general business trends, but that his company would be vitally affected by these trends. But even a few opinions from outsiders did not solve the problem; they were formed in just the same manner and subject to the same limitations, and, besides, they were often contradictory. While such faint straws might have been acceptable, in the absence of better data, in past days where business enjoyed comparatively liberal margins of profit,

they have proved utterly unsatisfactory in the present day of keen competition and small-profit margins.

The business world now has a means for providing an answer to this question, so that the executive may obtain the precise facts instead of relying on mere opinions. The solution was found in the collection and compilation of actual current facts, weekly or monthly, occasionally even daily, from representative concerns in each important industry or trade, to form a composite picture of the business situation therein. With these statistics covering the principal industries at his command, the business executive of to-day can answer the question "How is business?" in a simple yet correct way. Here are a few instances of such answers and of the resultant concrete savings through the use of current statistics:

#### RESULTS OF USE OF STATISTICS

A building-supply company, in negotiating for its yearly contract for cement in 1924, was quoted an increased price by a salesman who stated that the supply of cement was low and urged that a quick purchase be made before a shortage developed with spring building operations. By studying the business statistics as presented in the Survey of Current Business, the purchasing agent of this company discovered that cement stocks were 1,500,000 barrels higher than a year before, and that prices seemed to be on the decline. He furthermore ascertained that with a surplus of over 300,000 idle cars at the end of 1923, as against a shortage of 68,000 cars the year before, the railroads could easily deliver his goods promptly should he suddenly require a larger supply later on. These facts enabled the company to save 30 cents a barrel on a large order of cement, and, through such study of statistics, it has saved thousands of dollars annually, according to the purchasing agent.

A sugar-refining company regularly studies the data on imports, exports, and meltings of sugar to determine the probable consumption and to adjust its purchase and sales policies thereto. By August of 1925 these statistics had so definitely indicated the trend for that year that the company was enabled to forecast the unprecedented consumption of sugar while the year was little more than half over, so as to take full advantage of its opportunities for increased sales.

A firm of leather exporters formerly had to spend a great deal of time learning about the leather market through interviews, etc. Now, they can see the situation at a glance through the leather statistics as presented in the Survey of Current Business. The results have included not only a great saving of time but, even more important, savings from 2 to 4 cents per foot on leather transactions during the past five years through actual knowledge of market conditions.

The various current statistics pertaining to the agricultural situation, including business statistics as well as those relating purely to agriculture, are analyzed regularly by the Kansas State Agricultural College for the benefit of the farmers. This organization reports that farmers, acting on this information, sold their hogs in September, 1924, at from \$2 to \$3 per 100 pounds more than they would have received had they waited until November, as was the usual custom. Three wheat farmers are reported by this college to have made gains of 47, 50, and 60 cents per bushel, respectively, in their sales of wheat following the sales policies based on statistical analyses.

While these agricultural results may be somewhat exceptional as to the amount of profit realized from statistical information, instances of definite dollars-and-cents savings through the utilization of business data are available from all kinds of businesses. Illustrations of the use of such statistics, taken from most of the important industries, are given in detail in Chapter II.

#### DEVELOPMENT OF STATISTICS

The rise of statistics from small beginnings to a position of commanding importance as the "right hand of every modern business," as an industrial executive recently expressed it, has been a definite response to the growing needs of business.

When business was small and orders were given by word of mouth, the proprietor knew every little detail of his business; records and statistics were unnecessary. As business expanded, as specialization was introduced, and as markets at a greater distance were reached, the proprietor found he had to keep memoranda of his orders and of his accounts, as well as of price lists. Next he employed a bookkeeper, whose sole duty was to keep statistics showing the firm's relations with others. Still later the accountant was called in to prepare periodically a balance sheet and income account, to show the proprietor the exact standing of the firm or corporation. Finally, in the growth of business and the attainment of national distribution by a large proportion of our products, there came the need for knowledge of national business trends through a combination of statistics of concerns in related lines by a central collection agency, such as the trade association.

The business executive to-day can not have either in his mind or in the possession of his own concern all the facts necessary for intelligent business judgment. He must not only know how his firm is doing but must compare his branch of industry with industry as a whole and must know the buying conditions of his customers as well as the condition of his material markets. These data he can not get

within the confines of his own organization, for they can be gathered only by agencies representing or collecting figures for an entire industry.

#### NEED FOR CENSUS DATA

The result of this need has been the growth of statistical services. The United States has the reputation abroad of recording statistically almost every feature of national life from its beginnings, and there is a good measure of truth in this belief. Statistics of our population were collected almost from the founding of the Nation through a regular census; and later manufacturing, agriculture, and other phases of business and industrial life were added to the census returns as these features developed into important parts of our economic being. These statistics were all developed for the general purpose of knowing how our country was progressing, and thus preparing a foundation of facts upon which both public and private business policies might be based. Population statistics were inaugurated for the specific purpose of apportioning congressional representation, while from time to time they have served other specific purposes, such as the setting of immigration quotas; and they are used extensively by business firms in market research, setting sales quotas, etc.

The value of census data may well be shown by comparing the exact knowledge which we possess on manufacturing and agriculture, as a result of these figures, with the almost complete lack of knowledge of the facts of distribution, such as wholesale and retail trade, of which no comprehensive census has been taken. The demand for these latter figures has become so great, however, that Congress is considering a census of distribution to be taken in 1930.

Valuable as the census returns are in showing a complete picture of the more important phases of our economic life at certain periods and the growth which has been made between these periods, they lack because of their completeness the element of timeliness. A complete census on the scale of the present decennial censuses can not be undertaken more than once in several years. The demand for up-to-date facts, however, has resulted, for instance, in the change of the census of manufactures, from a 10-year to 5-year interval and later to an interval of only 2 years.

To bridge the gap between census reports and to give business men the data required for current business judgments, a system of intermediate reports has been developed, covering some items yearly, others semiannually or quarterly, but most of them monthly or weekly. Such a system of current statistics shows the immediate changes in the economic picture which business executives need to know in order to plan intelligently for the future. Each series of

current data can be related to the census of manufactures to find out how representative the figures are and thus to what extent they are true indicators of the trend of that business or industry. Only these current data are treated in this booklet, for the census data and other figures collected annually or less frequently are used in other ways, chiefly in market research.

### EARLY CURRENT STATISTICS

Current business statistics are not new. Price data, for instance, may be found in commercial papers extending back about a century. Import and export data of necessity have had to be compiled by the Government from its early years. Commodity exchanges were also early entrants in this field. Dealings in such staples as cotton, grains, and coffee require a fund of accurate information on weather, crops, receipts, exports, stocks, and so on. Through the exchanges speedy and complete reports were developed many years ago in these commodities. Most of the early private figures, however, were financial in character. Few industrial data, prior to the twentieth century, were available month by month, and such figures as were gathered were compiled mainly by financial papers or by the Government in connection with its obvious needs.

During the first decade of the twentieth century statistics on industrial lines began to be collected. Trade papers collected some of these, while trade associations also came into the field, at first largely in connection with data on credits and general financial conditions. But about 1910 or shortly thereafter many monthly reports on their respective industries were inaugurated by various trade associations, such as the data on wool-machinery activity, gathered by the National Association of Wool Manufacturers; on fabricated structural-steel orders, gathered by the Bridge Builders and Structural Society (both of which were later collected by the Government); on oak flooring, gathered by the Oak Flooring Manufacturers Association; and on iron ore, by the Lake Superior Iron Ore Association. The Government was also brought into the field of collecting monthly data on articles of prime importance, such as cotton, through the Bureau of the Census, and coal, through the Division of Mineral Statistics, originally of the Geological Survey, but recently transferred to the Bureau of Mines of the Department of Commerce.

### STATISTICS AND THE WORLD WAR

It remained for the outbreak of the World War to give a real impetus to the collection of current statistics. Shortly after the war began there occurred a period of unemployment. Many States, such as New York, Wisconsin, and Massachusetts, started in 1914 and 1915

the collection of monthly statistics on employment to show the true condition of affairs so that proper plans could be made for the relief of the unemployed. Then, with the commencement of the huge supply program of the Allies in 1915 and 1916 and the rise in prices which it brought all along the line, came the clamor against the high cost of living. Various States, the Federal Government, and private organizations began the collection of retail-living costs, based on comparison with pre-war figures.

With the entrance of the United States into the great conflict in 1917 came a further step in the development of current statistics. Our huge resources of materials and supplies were of prime importance in the conflict. The business men drafted by the Government as advisors on their special industries had to know exactly what resources were at hand and what could be produced in a given time in order to meet the war requirements. Immediately current statistics of many kinds were set up, under Government direction, covering the more staple commodities, such as petroleum, cement, leather, and vegetable oils. In other cases trade associations were called upon for figures on their industries. Business men, however, were the ruling spirits in this demand for facts upon which to conduct the war. The result of this great increase in statistical activities was a knowledge of current conditions in various industries never previously possessed, which proved a factor of the utmost importance in the smooth movement of supplies abroad. Some have even been bold enough to claim that statistics won the war. At any event, statistics did their share. They provided the only means of knowing accurately national conditions of supply and demand in each industry.

#### POSTWAR DEVELOPMENTS

After the armistice, industry and commerce longed to get on a peace basis but found that postwar conditions were as different from pre-war as they were from war conditions. The war had raised some industries, such as steel and copper, to undreamed-of heights. It had greatly depressed other industries, such as building construction and musical instruments, holding them temporarily as nonessentials. Peace found the war-inflated industries with large stocks on hand and no market, while the deflated industries had no immediate facilities for supplying a huge increase in demand which had been artificially dammed up during the conflict.

In this state of unrest the discontinuance of many of the war-time statistical activities took away the foundations upon which the business men had become accustomed to base their plans for the proper conduct of business during the war. The new demand for goods



was unknown, supply statistics in general were unavailable, and prices bore no relation to the pre-war scale. Business had to take snap judgment instead of relying upon proved facts. This was an important factor in the vicissitudes of the first three years after the war, comprising a mild depression in the first quarter of 1919, a sudden boom in the latter part of the year and the early months of 1920, and a collapse and depression extending through 1921.

The need for current business facts was manifested to an unusual degree during this period and resulted in the inauguration of statistical data in many lines of industry immediately following the war, chiefly through trade associations. Government agencies also started the collection of data on many lines at the request of the industries covered. Since the end of the war there has been a great increase each year in the number of statistical inquiries undertaken, as industry after industry has seen the need for prompt facts on its own business and the success with which other industries have used statistical data to solve their business problems. More than half of the items now included in the Survey of Current Business have been developed since the beginning of 1919.

#### CONTROLLING THE BUSINESS CYCLE

Booms and slumps occurred regularly before 1920, usually in conjunction with financial panics. The Federal reserve system has proved a great stabilizer of the financial fabric, and the business fabric seems to have responded equally well to control by statistical facts.

In past experience the boom has usually resulted from an overdoing of good business. When prices started to rise, many people saw the chance to make profits by buying more goods to resell on the rise. The result was an oversupply of goods, and as soon as this was realized and demand stopped, prices immediately took a tumble, production ceased, unemployment occurred, and therefore consumer buying decreased even further. When the minimum demand finally exhausted stocks on hand, production started to increase, more labor was employed, consumption increased, and the prosperity part of the cycle started, usually to culminate later in another boom.

Many studies upon this problem have led to a clear definition of the succession of events and to methods of elimination of the tremendous losses in this overturning of business. The reader is referred particularly to the Report of the Committee on Business Cycles and Unemployment of the President's Conference on Unemployment.

Two factors stand out prominently in the study of this question in recent years. The first is the common understanding of the approxi-

mate causes of the cycle. From this knowledge the correct remedy when booms are seen approaching is not further expansion in the hope of some added profit, but contraction and liquidation of stocks so as to be ready for the approaching storm instead of being caught in losses greater than all previous profits.

The second factor is the recognition that the signs of the trend of the cycle can best be seen from current business statistics. In 1920, as noted above, few series of statistical data were available. This condition led to the establishment, by Secretary Hoover, of the Survey of Current Business in the Department of Commerce in 1921, to collect all available statistics under one cover for the guidance of business executives and to provide a medium for the extension of these facilities. The public now has the benefit through the Survey of Current Business of over 1,500 separate indicators of business trends, and the number is continually increasing. It also receives more specialized information on agriculture through *Crops and Markets*, published by the Department of Agriculture, on labor statistics through the *Monthly Labor Review*, published by the Department of Labor, and on general financial and business data in the *Federal Reserve Bulletin*, published by the Federal Reserve Board. The monthly bulletins of the Federal reserve banks and the publications of the individual trade associations furnish additional information. Technical periodicals and business newspapers not only publish these Government and association figures extensively but often compile data of their own. Furthermore, these data are extensively commented upon and forecast from by a host of private business services and house organs of banks. Not only does the reader have more figures and in more available form than ever before, but the data are usually more representative than in the past, better compiled and better explained.

This knowledge of the business cycle and of statistical data has been used by business men to accomplish great savings for their own companies. A brick manufacturer, for instance, saw from the charts of his association's statistics that overproduction took place in this industry when orders and shipments slackened, thus increasing stocks. On the other hand, the manufacturers underproduced when orders increased by filling orders from stocks. The result was an accumulation of stocks produced at relatively high cost which were a financial strain on idle capital and eventually resulted in liquidation at lower prices. This firm, instead of stocking while prices were falling, stocked ahead as soon as demand appeared to increase, which saved them from carrying idle stocks over depressions and enabled them to produce stocks at the lowest costs when better workmen were available. Through this method and slight price cuts whenever total stocks in the industry mounted, this manufacturer's business was

always in liquid condition, gaining interest earnings from investments and profits from low-cost stocks, thus making his capital work both ways. Moreover, when stocks were liquidated and securities purchased, the latter were usually at a low price and interest rates high, while in starting to stock goods when business was beginning to advance, securities would be high owing to low interest rates, and a profit could be obtained in liquidating them to accumulate stocks.

#### RESULTS OF STATISTICAL CONTROL

It is too early to be sure that this increasing use of business statistics has actually succeeded in avoiding booms and slumps, since hardly six years have passed since the last depression. However, the statistical data on the intervening period indicate an absence of large major swings. The upward tendency in orders, production, and prices beginning in 1922 was abruptly halted in the spring of 1923, when it was feared that excesses might occur such as took place in 1920. With signs pointing toward another inflation period, building contracts particularly were laid aside, and instead of a peak boom and possible calamity thereafter, there resulted a very slight recession in activity. After a moderate increase in the following winter, business underwent a short period of stagnation awaiting the election results of 1924, but in 1925 and 1926 the productive activity of the country, though the largest on record, was the steadiest noted in modern times. The year 1926 showed an increase over 1925 in most lines, but the curve was still tending toward a straight line month by month rather than one zigzagged with peaks and valleys. A decline in productive activity at the end of 1926 was followed by a recovery to previous levels a few months later and by a recession in the latter part of 1927, in which the automobile industry was chiefly affected.

A close observer of business trends, Dr. Lewis H. Haney, director of the bureau of business research of New York University, believes that the business cycle is gradually being brought under control, though pointing out that the evidence rests on only a short period of time. This control, he states, is found to be exercised through (1) statistical information which has reduced ignorance concerning true conditions of business, (2) hand-to-mouth buying, which keeps inventories low, production on an even keel and a closer balance between output and retail sales, (3) prompt curtailment of production when in excess of consumer demand, (4) financial control checking speculation, (5) recognition of consumer demand and high living standards through reluctance to force wage reductions, and (6) adaptation of goods to consumer demand through industrial and market research. (See *Printers' Ink*, June 10, 1926.)

It is interesting to note that the above methods are closely allied to the recommendations of the Committee on Business Cycles and Unemployment, which were (1) the collection of fundamental business data, (2) larger Government statistical service, (3) research, (4) control of credit expansion by banks, (5) control of inflation by Federal reserve system, (6) control of business expansion, (7) control of construction, (8) public utilities control, (9) unemployment reserve funds, and (10) unemployment bureaus.

### BUDGETING

Besides the mere analysis of statistics at different times, many companies put these figures to work in a comprehensive plan for the conduct of their business, which is usually made at the beginning of the year in considerable detail and subject to change later if conditions warrant.

A large concern manufacturing pipes and fittings keeps forecasting charts for each class of goods which it makes. These forecasters are each composed of four charts—one shows the gross orders received; the second, the normal seasonal conditions; the third, an elimination of the seasonal and normal growth, together with a correlating index; and the fourth, the actual orders as a percentage of those received during the preceding year. The correlating index in the third chart is composed of the statistics of a number of industries properly weighted, which are shown by experience to have the closest advance correlation to the particular product for which the chart is made. Each element of this correlating line may be looked to for an individual forecast, and the combined forecast is used to budget the probable sales and production of that line for the coming year by quarters. (The methods in detail are presented in *The Economic Control of Inventory* by Joseph H. Barber.) Comparison of the period since the establishment of budgetary control by this company with previous periods shows (1) larger average production by the company, although the users of its products were less active; (2) a decrease in average employment of 30 per cent, due partly to other economies; (3) more regular employment; (4) reduced labor turnover; (5) more prompt delivery of orders; (6) profits for 1924, attributed entirely to the system of budgetary control through its forecast of the declines and increases in orders.

A large corporation in the automobile field has a definite plan of financial control through a forecasting program based upon growth, seasonal variation, condition of general business, and competition. This estimate of a year's business takes into account not only the production and price of its products but also such factors as the earnings on investment and the amount of capital required to handle

the business. Production schedules are based upon plant capacity, proper accumulation of stocks, and maintenance of reasonably steady rates of operation. After the year's program is made it is adjusted from time to time as statistics of retail sales of automobiles indicate that the trend is above or below the original forecast. Purchases and material stocks are apportioned in accordance with the budgeted production, thus insuring a minimum yet essential stock of materials on hand. (Further details are presented in the paper by Albert Bradley, assistant treasurer, General Motors Corporation, before the American Management Association, March, 1926.) This budgetary control through statistics resulted in 1925 in an improvement of 50 per cent in productive inventory turnover (i. e., total inventory less finished product), greater regularity in employment, 25 per cent better turnover of cars in dealers' hands than in any previous year, and a larger volume of business with a smaller profit margin per car without impairing the return on capital invested.

An important metropolitan department store prepares a merchandise budget three months before both the spring and the fall seasons. The sales of each department are estimated for the coming season on the basis of its sales for the past two years, projected according to the trend and modified by general economic conditions as shown through current statistics as well as by style changes and other extraneous conditions. On the basis of this estimate of sales each department's stocks are planned, and its expenses and mark-ons are determined. The estimates are checked up weekly as the season progresses, and results have usually come within 1 per cent of the estimates. Once the merchandise budget has been determined a financial budget is planned, indicating the estimated income from sales each week and the estimated expenditures on purchases and salaries. Similarly, an operating budget breaks down the weekly estimated expenditures into factors and departments. As a result the store's operations are stabilized through planning in advance. (Data furnished by Mr. Ernest Katz, controller of R. H. Macy & Co. (Inc.), New York City.) By such methods, department stores have weathered business depressions.

For the past five years a company manufacturing stationery has been forecasting its sales one year ahead and finding that such forecasts usually come within a fairly close range of the actual sales for the year. The company analyzes separately (1) the long-time growth, (2) the seasonal fluctuations, and (3) the effects of business booms and depressions, as reflected in its sales record. It also compares its sales performance with certain selected economic barometers of various types, and, by a combination of statistical procedure,

tempered by judgment, estimates in advance its sales by quarters and by months for the current year. As a by-product this company reports that its forecasts have worked so well that they led to a better control of production as well as sales. The balancing of production to sales has, in turn, led to a reduction in the amount of inventory and to an increase in inventory turnover. (See *Better Business Through Research*, published by the Metropolitan Life Insurance Co.)

Probably the most extensive control through budgetary methods is that exercised by railroads through the car service division of the American Railway Association. This association has established regional advisory boards throughout the country, composed of business men in various lines and divided into committees, each treating an important commodity in its district. Each commodity committee consults with producers in the district for an estimate of the cars needed for the coming year, by months, and then prepares a budget of the car supply for its industry. The totals resulting from these estimates give a picture of the contemplated production of the United States for the coming year in terms of car supply, and they enable the railroads to plan the use of their cars to the maximum efficiency, to place their orders for new equipment accurately, and to eliminate car shortages and congestion. More specifically, the day-by-day delivery of grapes from California into New York City was so scheduled that cars came in regularly instead of at haphazard intervals, resulting in good average prices to the producers instead of a famine price one day followed by spoilage of many cars of grapes the next, owing to a glut in the market from the arrival of too large a supply for immediate needs. Such statistical control was also applied to the receipts of livestock at some of the western markets, when the railroads showed producers that they could stagger their livestock loadings and thus obtain a more stable price for their animals and at the same time enable the railroads to handle the traffic with fewer cars. The general results of such plans showed that car loadings in 1925 increased 5 per cent over 1924, while the average number of freight cars owned by the railroads averaged only 1 per cent greater than in 1924, and car shortage was almost eliminated. In 1926 loadings were 4 per cent above 1925, while the average number of cars owned by the railroads decreased.

Budgeting on the basis of current statistics has also proved of great benefit in the insurance field. A company covering workmen's compensation insurance uses the general trend of pay rolls throughout the country as a guide to the amount of premium to be received on its policies. This premium depends on the employers' pay rolls, which are difficult to ascertain before the expiration of the policies,

and yet the insurance company must incur expense without knowing the receipts from its policies, unless forecast from general pay rolls. This company, therefore, prepares a budget on a forecast pay-roll curve, and any differences in the actual data lead to remedial steps, if necessary.

#### GENERAL EFFECTS OF BUDGETING

The forward planning of production and purchasing schedules adapted to probable sales tendencies has had a most salutary stabilizing effect on the entire business situation. The railroads, for instance, estimating closely the requirements of the shippers for the coming year, as previously described, thereupon make their equipment and improvement plans to coordinate with prospective traffic needs and place their orders at the beginning of the year for the greater part of the materials needed. The material and equipment suppliers, in turn, know what they will be required to furnish during the year and can adjust their production schedules to secure regular delivery of the goods. Regularity of employment, in its turn, results in better and more stabilized consumer purchasing, which is reflected through the retail stores and back again through all the various industries. When such purchasing policies are adopted not only by the railroads but by automobile manufacturers, pipe producers, department stores, and others in many lines of business, the cumulative effect in producing stable business for all industries can hardly be overestimated.

The greater knowledge of business facts seems to have eliminated much of the speculation from the ordinary business channels. Speculation still continues in the stock market and in real estate, but the quick decline in stock prices in the early part of 1926 and the cessation of the Florida real-estate boom at about the same time showed no effect on business trends. This would indicate the absence of speculation in business plans through greater knowledge of facts. In earlier periods such a double-barreled collapse in speculative activities might have caused a sudden decline in business, although easy credit conditions and falling commodity prices did their share in preventing serious trouble in 1926.

Greater planning ahead on the basis of facts rather than guesswork has resulted in cutting down expenses through regularity of operations and mass production. These savings are being regularly passed on to the consumer in the form of lower prices, and still the producers are making money through their larger volume.

#### BUSINESS MEN CITE IMPORTANCE OF STATISTICS

The importance of current statistics to business executives was well expressed by Gerard Swope, president of the General Electric Co., in an interview upon the program of the newly formed National

Electrical Manufacturers' Association, of which he was elected president (quoted in the *Electrical World*, December 4, 1926) :

In my opinion the greatest immediate good will result to electrical manufacturers from this association if it brings about the tabulation and dissemination of industry statistics and secures the adoption of a uniform cost-accounting system by all manufacturers. Statistics and cost accounting are fundamental to the intelligent conduct of any business. An essential requirement for successful management to-day is prompt and accurate information on available business and market conditions. Another essential is a knowledge of costs of manufacture. These two business aids arm an executive with the tools for doing business successfully. An organization such as this permits the members to cooperate in the compilation of these data for the benefit of all.

The collection of industry statistics is one of the great tasks of a trade association. These statistics must be made available to the public as well as to members of the association and must conform to certain restrictions, but not to a degree where their benefit to the industry is impaired. Statistics as to production, quantity produced, shipments, sales, orders received, unfilled orders on hand, stocks on hand, and of employment can be collected and disseminated.

The president of a large hardwood mill recently stated to the Chamber of Commerce of the United States the following advantages of such statistics :

Trade statistics gathered by our association are decidedly helpful in the operation of our business. In fact, they are a necessity.

The two major objectives of statistics are, first, that all those engaged in industry may be as nearly on an equal basis as possible in regard to knowledge of the basic industrial facts, and, second, that each concern may regulate not only the prices but its sales and production policy in harmony with economic conditions.

A man well informed as to the basic facts of his industry can proceed with more confidence in ordering the daily affairs of his business; he can follow a policy wherein there is a basic continuity as against a policy of opportunism in which he may find it necessary, and generally does, to feel his way and reverse himself from time to time.

The following comment by a hosiery manufacturer reflects the usefulness of statistics to that industry :

The report on production, orders, and stocks of hosiery for the United States is a marvelous undertaking and is without doubt the greatest step that possibly could have been taken to aid domestic manufacturers.

Similar comments from business men relating to the various current business statistics are being made continually and testify to the great value being found in such data by business firms, both large and small, in all lines of trade and industry.

#### DIFFICULTIES IN FORECASTING

The reader must not imagine that statistics by themselves can effect any magic transformation of the Nation's business ills. The errors made by business-forecasting services in predicting the trend



of future events shows that statistics can not of themselves lead to 100 per cent accuracy. But the trouble is not so much with the statistics as with the use made of them. The saying that anything can be proved by statistics has long been familiar and should be a warning to those using statistical data to be on their guard against features which might endanger correct conclusions.

The reasons why statistics have not always proved infallible predictors are not far to seek. In the first place, statistics are often inaccurately compiled, or they represent such a small percentage of the industry as not to reflect general trends, or care has not been taken to make the figures comparable from month to month. A discussion of the methods used by compiling organizations to eliminate these defects is presented in Chapter IV.

Secondly, the correct interpretation of statistics depends on reading them in the light of previous experience, and our previous experience with most statistical indicators in normal times has been woefully small; but it is increasing right along, and as our statistical background broadens we may expect even better results.

Thirdly, predictions as to physical phenomena, like the weather, are still, after many years' experience, far from perfect; the jokes about the weather man and his mistakes are legion. How could we expect better results from a new science, hardly out of swaddling clothes and depending for its data not so much upon measurable physical forces as upon the whole gamut of human emotions and actions?

In the fourth place, proper interpretation of the figures depends to a large extent upon knowledge of the industry or business involved. For instance, Government receipts for March are not at all comparable with those for February or April, because they are swollen by the quarterly income-tax payments, and this circumstance also affects the important figures on bank debits to a lesser extent. The severe decline in automobile production which occurred in August, 1925, was due not to a slump in the industry but to a change of models by an important manufacturer; the curtailment in the summer of 1927 was due to similar causes. Strikes, weather conditions, crop variations, foreign wars, and many other extraneous circumstances may considerably alter business trends; and unless such conditions are accounted for, the interpretation may be entirely misleading.

A fifth consideration is that correct interpretations are more necessary than correct predictions. The business man's chief concern is to know the facts, so that he can base his own policies thereon; and, though it may be useful to perceive what is going to happen in the future, the means of improvement are of most practical importance. The physician needs in each medical case the proper diagnosis

of the facts of temperature, pulse, breathing, etc., but he may not be able to predict with certainty the recovery of his patient; his diagnosis, however, will be the means to lead to recovery, if possible. So many extraneous happenings may intervene between the present and the future, both in medicine and in business, that predictions are often hazardous, and, furthermore, the perception by a large number of people of the tendency of business events may actually nullify the foreseen event. As an example of this tendency may be cited the failure of the price of securities to advance after the issuance of very favorable news, because so many knew of it in advance that purchases were made gradually in anticipation thereof, and when the event took place there was little further buying to advance the price. In fact, securities often decline when good news is published because those who bought in advance wish to take their profits, and thus the selling orders may outweigh the buying orders.

Any inability to predict the course of future business with certainty should not be charged against statistics but against our use of them. Because past generations of physicians did not correctly predict the outcome of their cases or because our early engineers could not make the steam engine or the telephone do what can be done to-day, was that cause to stop the ascertainment of further facts along those lines? In the physical sciences inability to predict has meant merely the further collection of data until the problems were solved, and, similarly, the present inability to predict the future business correctly should not be taken as an indication that statistical data are useless and should be scrapped, but that more data should be gathered so that more interpretations and better predictions can be made.

Statistics are not the whole cure for business ills or the whole force of business progress any more than the compass can make the ship sail. But the information which the compass gives of the ship's course is vital to its proper navigation, and, similarly, statistical information on the course of business is becoming more and more vital to the proper steering of the course of each industry. Rule-of-thumb methods and guesswork may have been useful in past generations, but those industries and concerns which still cling to antiquated methods because "Grandfather made money this way, and I guess I can," are being pushed aside by twentieth-century ideas, just as the sailboat was pushed off the ocean, the horse car off our city streets, and the candlelight from our homes.

## II

### HOW THE FIGURES ARE USED

**SUMMARY.**—Specific examples of the uses of business statistics, gathered from actual experience, are presented here, classified into the following industries or businesses: Textiles, metals and machinery, coal and oil, leather, automobiles and accessories, paper and printing, publishing, real estate and construction, engineering, lumber and clay products, chemicals, food products, public utilities, transportation, advertising, accounting, banking, insurance, trade and commercial organizations, law, education, Government, and miscellaneous.

Concerns may apply to their own industry the principles used by other industries. The most popular usage is the comparison of the company's figures with the figures for the industry as a whole, to see if the concern is gaining or losing in the competition.

Besides the concrete savings mentioned in the previous chapter, many uses of statistics have been reported which can not be expressed in terms of savings in dollars and cents. Instances of these uses have been collected largely from requests sent out by the Department of Commerce to readers of the Survey of Current Business and from information gathered by the Chamber of Commerce of the United States from trade associations and their members. The most concrete examples of such uses are classified below by the general nature of the industry, so as to give suggestions to others in the same or related lines as to how to utilize current business statistics to the best advantage. Other specific instances, relating principally to the boom period of 1920, are presented in the Report of the Committee on Business Cycles and Unemployment of the President's Conference on Unemployment.

It is suggested that the reader examine not only the data relating to his own industry, as shown below, but also those for other industries, because the uses of statistics made by other industries often suggest methods which can be applied to one's own industry. One business executive, for instance, in reviewing the manuscript of this chapter, jotted down many hints for his own use from the examples not only of his own industry but of others scattered through the chapter. After all, the business principles used by one industry are applicable to most other industries, whether they refer to statistics or selling or purchasing or accounting, and this is well proved by the frequency with which business men are reaping the benefits from policies suggested by the experiences of other industries.

## TEXTILES

Figures on raw cotton are used extensively by those interested in this commodity in studying the underlying conditions and comparing the price fluctuations. A cotton firm uses the figures to examine business tendencies of other years where the problems and conditions are somewhat similar to those under consideration. A cotton-finishing concern finds that keeping track of the consumption of various commodities is useful in purchasing materials and plant supplies. A cotton manufacturer reports using the statistics to obtain indications of the sectional trends and of the activities of the industries to which he sells. Another manufacturer uses these data to control purchases, dispose of stocks, and plan the rearrangement of classes of production.

A firm of wool dealers finds that a study of production, imports, exports, and consumption of wool places its operations on a more stable and less speculative basis. A rug-manufacturing firm uses the various current figures in planning its purchases and regulating its stocks of finished goods, while another rug manufacturer uses the statistics to check business throughout the country and to get a general idea of business conditions. Custom tailors report using to advantage the statistics on silk and wool. A manufacturer of hats compares his own business with the various totals by means of charts and index numbers and attempts to forecast the probable production and sales of the industry. A firm of wholesale clothing dealers sends salesmen to those communities where industries are located which are shown by current business statistics to be in the best condition.

A manufacturer of cotton underwear uses data on employment, food costs, general production, and business as guides for his own business. A knitting company not only keeps informed of general business conditions through current statistics but uses them particularly as a guide in its purchases of woolen and cotton yarns. A firm of selling agents for underwear and sweaters watches particularly the data for other businesses, owing to their direct connection with the ability of labor to consume these products; this is done through charts and percentages. A trade association in the knitting field uses these figures in solving members' problems of buying, employment, production, and advertising.

In the silk industry current statistics are used constantly, as evidenced by frequent inquiries to the compiling association for dates of publication of the figures, for duplicate copies, and for general statistical data, as well as general comments throughout the trade.

Textile jobbers report valuable information gleaned from business statistics. One firm studies the position of the business cycle from data on production, money, etc., to anticipate business conditions.

Another representative of a large jobbing and retail dry goods house summarizes for his customers the market conditions as to prices, material stock, finished stock, and their comparisons with previous years.

Although no data especially relating to millinery are available at the present time, a firm in this line compares its sales with the production and prices of various textiles, particularly in chart form, over a long period of time. Lace manufacturers report using the figures to study production and expansion programs. A suspender manufacturer in this manner schedules his purchases of raw materials, such as metals, leather, cotton, and silk.

An important firm manufacturing artificial leather through spreading pyroxylin upon textile fabrics compares its own business not only with the totals for pyroxylin-coated textiles but also with about 20 different business series. These data are charted as moving averages on a 12-month basis, and often definite sequences have been found which have helped in forecasting the company's business.

#### METALS AND MACHINERY

A great range of statistical data is used by steel manufacturers in planning their business policies. One company, for instance, watches particularly the statistics of agriculture, building construction, automobiles, railroads, and exports in order to see how the consumption of steel may be affected, while prices, wages, and living costs are watched as bearing on wage questions. A manufacturer of sheet-steel products compares his new orders with those of allied industries to find out and improve his weak points. A fabricator of structural steel watches the figures on building construction and the trends of the various industries to ascertain their prospects for expansion, which would mean larger sales of structural steel. Sales campaigns are conducted in the more prosperous industries. A manufacturer of steel barrels uses the monthly steel-barrel statistics as publicity material in his monthly price bulletin to companies using steel containers for shipment or storage. This manufacturer also determines regularly the proportion of the total business that he is getting, as well as the proportion in each territory, so that weak spots in the sales organization can be picked out. Another firm in this line compares its productive capacity with that for the industry as a whole by months for three or four years, and it has found that its business is becoming more stabilized each year. This company also finds out whether it is getting more than its share of certain weights and types of product. Statistics of the iron and steel industry are also extensively used by another firm in planning its sales programs and in checking up on the results.

A manufacturer of coal-handling machinery watches the growth of industries, mines, and railroads by means of current figures, so as to gauge the opportunity of his firm for sales in these lines. A maker of oiling devices uses building construction and automobile production as barometers with which to compare his business. A company manufacturing tools and hardware finds that the curve of its sales is preceded by construction figures 3 months ahead, by speculation 9 to 12 months ahead, and by money rates inverted 12 to 15 months ahead. A manufacturer of centrifugal pumping machinery finds that the curve of his business lags about 6 months behind the curve of building construction, and he estimates building programs in advance from indicators of the activities of the various industries. In a pump-manufacturing plant the various current statistics shown in the Survey of Current Business are passed to about a dozen officials who use them in different ways. Information on the trend of industries and agriculture is obtained from such statistics by a manufacturer of agricultural equipment as indicating opportunities for sales. A manufacturer of twist drills and reamers, who operates his plant on a quarterly budget for production and finances, checks his figures by charts of general business statistics. A firm making electrical switches charts the figures for both residential and industrial building contracts each month, using the monthly figures and also a three-months moving average from which it can anticipate the trend of demand for switches for both classes of buildings. The number of machines made in each industry is used by a bearing manufacturer as indicating maximum sales possibilities, and his own sales are charted against the total for the industry to show the efficiency of his organization. Study of the proportion of the individual business to the machine-tool industry, as a whole, led two managers in this field to determine the cause for the reduction in their proportionate share of the total business although gaining in actual value. This study led in one case to a reconstruction of the designing department and in the other to a reconstruction in the selling department, these being the respective weak points in the organizations. Other manufacturers in this same line found from figures of stocks, shipments, etc., that they had locked up a larger amount of capital per unit sold than had their competitors as a group. This led to revamping their production system, installing better methods of process and inventory control, and the liquidation of stocks, resulting in the accumulation of interest-bearing investments. The sales manager of a machine-tool company uses the trade statistics to concentrate his efforts in the prosperous centers, and a distribution of the business statistics throughout the sales department has been found to produce new confidence in business.

In the gold-mining industry a concern reports using current statistics to show the trend of conditions as they affect plans for improvement. A manufacturer of copper and brass compares the orders accepted by his company with similar data for the iron, plumbing, and other basic industries in order to forecast the concern's business. A mining concern in the lead and zinc field balances the statistics showing production with those indicating a demand for ore as a guide to its policies in selling or holding its ore and in contracting for supplies. A firm dealing in household enameled ware compares its own volume of business with general indexes, such as sales of department stores, hardware stores, mail-order houses, and chain stores, while data on wholesale prices and on imports and exports are also used in evaluating the condition of business. A wholesaler of silverware observes particularly the various retail-trade figures as forecasting the trends in this line of business. A manufacturer in this line states that the statistical reports of his association are worth all the money his company has paid in dues, while other manufacturers often ask that the statistical reports be forwarded to them on the road.

Among electrical manufacturers reporting uses for current statistics, one prepares business reviews for house organs and direct-by-mail copy to customers. Another uses them to inform its salesmen on business trends, while another finds in them a guide to the production of the various industries and their consequent need of parts. Another concern in the electrical line has established definite relationships between its business and the steel and building industries.

#### COAL AND OIL

An official in a coal-mining company uses current business statistics to check the stocks and consumption of commodities and the peak of seasonal demands in order to anticipate price movements, insure deliveries, and place business in the less active periods. Another coal-mining company watches the consumption of coal in the various industries, such as iron and steel manufacturing, machine shops, etc., to see the relative amount of coal consumed, which is figured from the production trends in the diagrams of those industries. Other coal-mining companies report using figures on living costs and on building costs as aids in their business and watching the trend of the coal business in order to formulate operating and sales policies. Another mining company reports that the business facts presented in the Survey of Current Business are passed all along the line to mine superintendent, store manager, and mining engineer for useful facts on their particular lines of work. A concern of wholesale coal dealers uses current business statistics as a basis for credits

to various industries in accordance with their current condition, to forecast future coal production, and to base prices on future contracts through knowledge of past reports.

A company engaged in refining petroleum uses as indicators of its business the index numbers of the cost of living and the various data on petroleum, tin, lumber, automobiles, and rubber. Another concern in this field uses the figures on bank clearings to construct business curves by districts to compare with the national situation.

### LEATHER

Manufacturers of leather belting reported to their association that, by comparing their own volume of business with the totals of the industry and their own prices with the averages of all firms, they could figure accurately how their firm was progressing in comparison with the entire industry.

### AUTOMOBILES AND ACCESSORIES

A manufacturer of automobiles reports that bank deposits, bank transfers, and automobile registrations, when corrected for seasonal variations, are particularly watched for trends of business. A manufacturer of trucks uses the various data presented in the Survey of Current Business to show by means of charts the position of truck manufacturing in the business cycle. Another truck manufacturer finds that the various business data enable the company to find the peak-buying period for each industry, and thus it can get its direct-mail literature to its customers at the period of greatest demand. The sales department of an important automobile manufacturer compares its sales with bank clearings outside of New York City and watches such barometers as pig-iron production, wholesale prices, stock markets, and especially farm prices. A motor company finds that the statistics for replacement parts are indexes to business trend, followed later in turn by original equipment, service equipment, and accessories.

Among manufacturers of motor accessories, one uses current statistics to keep a check on future tendencies in the industry and to compare its own shipments with those of the industry as a whole. Another company determines from the figures whether it is gaining or losing ground from month to month. In a third, the statistics are passed from desk to desk among its executives after the general auditor has superimposed over the curves of the industry similar curves of the company's business.

A company manufacturing rubber goods compares its own shipments with the totals for the industry to find out its relative position month by month and particularly its proportion of the export of rubber goods to the various countries.



## PAPER AND PRINTING

A manufacturer of paper bases his yearly contracts for materials on studies of current statistical data, and his prices are checked against the various data available. Another paper manufacturer uses the price indexes as guides to his purchasing and also watches manufacturing activity. A firm of bookbinders watches the statistics on fine paper and on leather production in judging when to purchase, while its sales are compared with those for steel furniture.

A firm engaged in packing waste paper gauges its market possibilities by statistics on production, operation, unfilled orders, and stocks of raw materials. A manufacturer of abrasive paper uses the data on the production and sales of industries consuming his product to check his sales program and to keep in touch with his markets. A manufacturer of paper boxes obtains through the Survey of Current Business information as to what individual businesses are thriving and the reasons therefor. Another manufacturer in this line checks up from his association's charts whether his sales are running in proportion to the industry as a whole and whether his pay roll is out of proportion to these sales; he also finds that statistics help to save money in purchasing.

A printing concern watches the variations in its figures from the averages for the industry, which leads to study of causes. If sales are lower, it endeavors to remove the cause; while if sales are higher, increased efforts may be made along the lines shown to be causing such increases. Another printing concern uses current business data as information for printing and sales advice, and excerpts are reprinted in its house organ. Another printer uses the figures primarily in deciding policies as to purchasing paper stock. A firm of lithographers uses current business data in its manufacturing, distribution, and financial policies. The various industries are studied as prospective markets in which to sell and are also analyzed as markets for their customers. Another firm of engravers estimates from current business statistics the returns which may be had from certain lines of business, in order to plan its expenditures. Manufacturers of sales books report that statistics are depended upon to see whether they are obtaining their proper proportion of the business.

## PUBLISHING

Study of current business statistics has been found a necessity by editorial writers connected with periodicals. In the newspaper field study of these data has been found useful in writing interpretative editorials on business conditions. Managers of newspapers also find the data useful in general management as well as for publication,

one newspaper using charts of such data to get an idea of future business fluctuations and to base supply calculations thereon. Another newspaper manager compares cost-of-living figures with wage scales and advertising campaigns. In the advertising department, one newspaper uses charts of the principal business indicators for the benefit of advertisers and advertising salesmen and also to answer inquiries. A financial daily uses the business statistics for general publication, the indexes of production, stocks, and unshipped orders being particularly useful to their readers. A press bureau reports redistribution of the business information in news style, while another press bureau uses current business information for general magazine and newspaper publicity and articles.

Current business information is especially vital to trade papers which must keep up to date on the conditions within their industry. A trade paper in the coal field checks through this means the market conditions affecting coal. A paper in the automobile field not only publishes the data extensively but also uses them for research and merchandising. A lumber paper uses the business statistics for editorial work in marketing analyses. A trade paper in the chemical field gauges business progress, makes market studies, and plans business campaigns on the basis of such current statistics. An educational trade paper analyzes business conditions influencing educational matter and construction of educational buildings as related to the sales of school materials. In the building field a trade paper uses the statistics on construction volume and cost and checks with other business items. In the laundry field a trade paper finds that income data enable estimates to be made as to the funds available for laundry work. A drug paper compares its own advertising with the total magazine advertising and also with the sales of drug chains. Other trade papers use these statistics for editorial comment, for rerun articles, and for trade information. A farm paper uses current business data to compare agriculture with other businesses, while another paper in this field analyzes the market for its advertisers, for editorial use, and for charting purposes. Still another farm paper keeps its salesmen informed on business conditions in this manner, preparing charts with basic information. A farm news service compares conditions for commodities used and produced by farmers. Another trade paper points out through current reports the growing markets and opportunities to the retailer through the increase in consumption of various products. Another publishing association in the automobile field finds that its advertising normally follows in volume the production of automobiles, and it can thus usually check its advertising volume and predict its future course through the output of automobiles.

A publishing firm bases its advertising solicitation upon the current data for various industries. A publisher's representative follows the trend of commodity advertising in national publications and also wholesale prices. A publisher's association watches the trend of various industries and particularly the changes in printing paper, while general trends are used for wage adjustments. A magazine publisher uses basic business data in a graphic service. A firm of book publishers studies mail-order sales, employment, and retail sales by districts in order to find the most active retail trade districts to check the activities of branch offices. The production and use of paper is particularly watched for purchasing. A publishing firm uses business data in preparing a monthly review of economic conditions for distribution by banks to their patrons, while another firm puts up these figures in chart form for the business pages of newspapers. Still another concern compiles the figures into an annual reference book. A firm engaged in business charting computes from current statistics the seasonal movements for business-control charts.

#### REAL ESTATE AND CONSTRUCTION

A real estate firm uses current statistics to determine investment possibilities by watching the trend of the business cycle. Another real estate firm uses data on money rates, prices, etc., to chart for the purpose of predicting future conditions through extrapolations. Another firm in this line compares building costs with the general price index to indicate the relative value of land. A firm of real estate subdividers uses the current data on pay rolls to check against the population of each city to obtain data as to the prosperity of the wage earner. A mortgage company computes property values through studies of costs of building materials and labor.

A firm of building contractors finds cost comparisons of great value in appraising and comparing past and present trends. Another finds that data on prospective prices for material and labor obtained by study of current statistics are great aids in bidding on contracts. Another building firm uses data on migration, movement of goods, and failures to ascertain prospective trends in building. A contractor uses data on construction volume in preparing a building index, and the general construction costs are compared with his own costs. A firm of engineers and builders prepares charts, showing the volume of production and of new construction by industries, to anticipate the need of building in each industry.

An association of building owners uses data on financing to correct abuses in bond issues secured by real estate. A close check is found by dealers in plumbing materials between their own sales and the data on enameled iron products and brass faucets. A manu-

facturer of ventilating equipment judges its probable sales and measures the efficiency of each territorial and domestic division of the sales department through current statistics.

### ENGINEERING

An engineer in the industrial field uses current statistics for reports on proposed factories, especially labor costs and their relation to material costs. Another industrial engineer prepares composite index numbers of business facts, while another determines through such studies the economic cycle for his clients. A civil engineer uses business figures to prove the prospective demand for a product, such as steel beams for residential construction, by comparing data on population, residential construction, lumber cut by regions, retail price of lumber in the East, and wholesale price of steel beams. An architectural engineer uses current statistics for making estimates of the cost of future work, while a concern of engineers and builders charts the data on particular industries and the relation between their production, stocks, orders, etc., to estimate the potential demand for new factories and offices.

A consulting engineer uses current statistics to show the trends of sales and production quotas, while another compiles data on general conditions for reports to clients. Another consulting engineer checks through such data the estimates on construction and on valuation work and determines the economic position of utility properties. Another engineer uses these statistics in testimony and valuation cases, and an engineer specializing in valuation work checks the reasonableness of inventories through the record of current prices. Another engineer checks appraisal values with past and expected trends, while an engineer in the consulting field keeps his cost indexes up to date through use of current business statistics.

### LUMBER AND CLAY PRODUCTS

A firm manufacturing lumber, sash, and doors finds especially useful in its business the statistics on lumber production, building contracts, softwood price indexes, food index, freight loadings, and bank conditions by districts. A hardwood lumber manufacturer finds that his statistical reports enable him to discontinue making such grades and thicknesses as are flooding the markets and to make such as are scarce, to determine inventory values, to guide price quotations, and to give proper cutting instructions to the mills for the various kinds of lumber. A manufacturer of upholstered furniture finds that reports of the lumber and textile industries indicate the best time to purchase materials. A retail lumber dealer watches the figures on production and shipments of roofing, flooring, and other

similar products. A dealer in hardwood lumber makes no purchases without first inspecting his association's statistical report, and in selling he estimates his cost of raw materials on the average prices shown therein; he finds that stock figures guide him as to the probable course of the market. Lumber manufacturers in the Great Lakes region report using average prices to obtain better knowledge of the actual market for lumber in order to get more business by underselling the market.

A manufacturer in the cement field studies all figures relating to cement and highways. A manufacturer of clay products watches the coal market, while car loadings are studied as indicating the best use of railroad cars. A brick manufacturer uses a chart of his association's statistics as a guide as to whether to stock brick. A manufacturer of refractory brick compares his own stocks with unfilled steel orders as an indicator. A manufacturer of fire-clay brick uses the wholesale price index of all commodities to adjust semiannually the price of his products over a 30-year contract. A manufacturer of paving brick always investigates the cause whenever his company's activities are below the average for the industry.

### CHEMICALS

A firm of manufacturing chemists finds that current business statistics indicate new fields that can be solicited for business. A manufacturer of linseed oil watches the statistics on linoleum, artificial leather, printing ink, paints and varnishes, margarine, and mayonnaise dressings for indications of the condition of these consumers of linseed oil. Paint and varnish manufacturers watch and record the data on lead, linseed oil, flaxseed, turpentine, and rosin. A firm engaged in the business of dry colors finds that building statistics give it a good estimate of the future requirements for colors, while charts showing employment and prices aid in forecasting business trends. A manufacturer of shoe polish watches particularly the statistics of tin, turpentine, and glass.

An alkali manufacturer obtains data on the trend of materials for future purchases through current statistics. He finds that the trend for burlap bags, for instance, depends on crops, such as jute, cotton, and sugar; also that the price of cotton is affected by rayon, while the amount of black cotton in a crop is also important, as Osaburg may be low in price, though the total cotton crop is short. A manufacturer of carbide finds that general business statistics forecast the trend of wages and labor supply. A manufacturer of industrial gases finds that his business follows the general manufacturing index with a lag of about six months. He compares his data also with

figures on steel, automobiles, and railroads. A manufacturer of licorice finds that his business is closely allied to the movement of tobacco.

### FOOD PRODUCTS

A flour miller finds that milling trends can be ascertained from statistics on wheat grindings, on the proportion of the capacity of flour mills operated, on stocks of wheat, and on milling yields per barrel. Another flour miller finds that cotton statistics are important factors in this industry, since they affect the supply of bags for flour and also because the prosperity of the Southern States is greatly affected by cotton, and thus the sales of flour to that section depend largely upon the state of the cotton-growing industry. Another flour miller finds that the cumulative flour production for the crop year to any particular date shows how much of the wheat crop has been milled, and with this cumulative figure the company's own operations are compared to find out if they are up to the average. A bread company watches the trends of retail trade and prices for indicators of its business, while a bakers' supply association uses statistics of food products, grain crops, etc.

An association of milk producers watches the various statistics of the general business trend in order to forecast future milk prices, while a concern dealing in dairy products finds comparisons of milk prices at the various cities useful. A firm of ice-cream manufacturers makes comparisons on a percentage basis as a guide to costs and sales. A meat packer finds that statistics on the activity of wool manufacturing tend to forecast changes in the price of raw wool, while unfilled steel orders tend to forecast changes in steel prices.

A firm of fruit growers compares prices with trade prices of their products and the prices of other commodities. An agricultural statistician finds that current business statistics are useful in furnishing data to newspapers for farm readers. A State agricultural department uses the data in the barometric section of its crop reports. An agricultural experiment station uses the statistics on general business conditions for discussion at farmers' meetings and also in research work; in the latter connection the exchange rate of the pound sterling has been found valuable for an index in forecasting apple prices. A farm bureau uses the statistics to show farmers how other industries keep tab on their business and how the farmers could apply the same principles to their own work. A firm of food brokers watches crop conditions, food production, yields, and bank reports in order to get an idea of business prospects in their field. Another food-products broker distributes the statistics on foodstuffs to the wholesale trade in concise form with comments. A grocery chain uses current data especially to compare costs in different cities;

while another grocery chain bases its future purchases on statistics of crops, stocks, consumption, and supply, finding that high living costs affect luxury buying but not necessity food. A restaurant watches statistics of food costs and labor conditions as affecting its current operations, while another restaurant also watches statistics of general business conditions. A hotel uses statistics on various foods to compare the cost of its food sales and of the ingredients going into its candy business. It also uses statistics on railroad operations and particularly of passengers carried in preparing forecasts of its rooming business.

A sugar-refining company estimates the distribution of sugar from the various statistical indexes of general prosperity. A company engaged in constructing beet-sugar plants estimates the cost of plants to be built by using known costs of similar plants in other years and estimating production costs in stated years. A candy-manufacturing company not only watches statistics of sugar production and prices but also more general data as indexes of prosperity, such as transportation statistics, stock sales and prices, mail-order sales, bank clearings, employment, interest rates, failures, steel production, and building construction.

#### PUBLIC UTILITIES

A telephone company makes up a business curve of its locality from data on retail sales, prices, and production of grains and livestock, employment, finance, and industrial production. Other telephone companies report the preparation of similar indexes on local business trends in order to gauge the probable growth of the telephone business of the community and thus make provision for expansion of facilities, etc. The plant employment superintendent of a telephone company uses data on wages and living conditions as a help in employment questions. A telegraph company correlates the revenues of telegraph companies with those of railroads, telephone companies, and the post office in order to discover the relative increases of these various lines of business. A cable company uses the figures on foreign trade to the countries which it reaches as indicators of their financial condition and general situation.

A gas company uses current business data in forecasting its coke and by-product business and in gauging the proper time for making its financial arrangements. The engineering department of a power and light company finds that current business statistics are helpful in predicting the prices of building materials, while an electric power company uses price indexes to value equipment retired from service. A public-utility company compiles various indexes of business by geographic divisions according to the location of its con-

stituent concerns in order to make its budget estimates and to check current work. Another public utility uses statistics on living costs to compare with its rates, while still another keeps track of industrial developments through the various business indexes. Another concern in this line uses the material not only to show the growth of industries but also for use in speeches by its executives and for general reference. A company engaged in public-utility appraisals uses the statistics to get an idea of probable future prices and business trends.

#### TRANSPORTATION

The commercial development department of a railroad finds that current statistics help in the preparation of agricultural and industrial development work as well as in various reports. A railroad freight agent checks his own traffic against the totals for all railroads and forecasts traffic trends. The valuation department of a railroad compares its own unit costs with those for the country as a whole. The claim division of a railroad association compares the amount of damages with the volume of business shown for each commodity handled. A railroad statistical bureau finds the compilations of current data, such as the Survey of Current Business, save a great deal of time in the preparation of data for Government compilations. A railroad rate committee uses the current business statistics in considering proposals for rate readjustments. A canal company uses statistics on cost of living, on transportation, and on raw materials.

A concern engaged in foreign trade uses the statistics of imports and exports classified both by commodities and by regions to study trends in foreign trade. An automobile export concern forecasts world economic conditions 90 days ahead by tabulations of foreign crop production and other data.

#### ADVERTISING

An advertising agency uses current industrial statistics for suggestions of possible outlets for products to be advertised. Another agency reports using the statistics to determine the consumption of a product and the relation of its clients' business thereto, while another agency uses this same relationship to plan its sales and advertising campaigns. Another advertising agency fixes sales quotas and advertising appropriations on the extent and trend of various industries, as shown by current statistics. Agricultural reports are used by an agency to guide advertising in farm districts, while another firm in this line gets a picture of general business trends from automobile production, bank clearings, trade advertising, life insurance, and security sales.



An advertising bureau uses current business statistics as the basis for market surveys and business promotional matter for manufacturers and advertising agencies. An advertising solicitor finds such figures aid in talking business conditions with clients. A bureau engaged in trade extension and advertising by means of current statistics interprets the results of advertising and trade-extension efforts.

### ACCOUNTING

An accountant reports that current statistics enable him to determine the relative size and importance of various businesses, while another uses the figures in budgeting mail-order business. An accountant connected with institutions uses the figures to compare per capita costs and commodity costs, while another accountant makes constructive suggestions to his clients on the basis of current statistics of industries and his own audits.

A business statistician finds that current statistical data aid him in determining advertising appropriations, while an investment consultant follows the economic status of various industries from the investment viewpoint through statistical data. A county auditor judges the trend of land values through statistics on interest rates, commodity prices, and real-estate transfers in order to give data for equalizing the assessment of buildings as between different years and also to fix the rates of capitalization of income to capital value through the market rate of money.

### BANKING

A national bank charts the statistics on pig-iron production and stock and bond averages to keep in close touch with conditions, while another national bank uses figures on wholesale prices as comparisons when large concerns are fixing wage increases. The economist of a national bank follows the indexes of production and distribution and examines them in detail for the trends of particular industries. A national bank in the agricultural region watches statistics of livestock and grain receipts and stocks of agricultural commodities as indications of the trend of prices. A State bank gives advice to farmers based on statistical reports of crops, stocks, etc., while a firm of private bankers compares particularly the production indexes, investment holdings of insurance companies, and automobile production. Another banking concern attempts to forecast the trends of orders, profits, purchasing power, money rates, and commodity and security prices.

A trust company uses current statistics to forecast the probable demand for funds and the probability of steady employment of pur-

chasers of articles on the partial-payment plan. Another trust company determines trends in prices and other business items, correlating them with financial statements in connection with determining lines of credit. The economist of a trust company uses current statistical data in giving advice relating to the shaping of bank policies, in helping customers, and in the bank's house organ. Current statistics are used by many Federal reserve banks in computing their various indexes of trade, etc. A savings bank prepares analyses of financial conditions through current statistics, especially to obtain trend of bond prices. A building and loan association watches the progress of building of various types. Statistics of fundamental conditions are used by a financial reporting concern as the bases of analyses of individual companies.

In the investment-banking field, a concern analyzing the securities of a particular company watches closely the statistical conditions of the industry concerned. Another house in this line follows closely the course of business through statistical data to forecast the market for buying and selling securities, while a firm of investment counselors finds charting bond prices useful in this connection. An investment-banking firm watches business conditions particularly relative to the demand for capital and the activity of industries. Charts are prepared by an investment banker to indicate comparison of general business conditions with security prices and interest rates. Another investment-banking concern uses current statistics to determine its policies as to inventories and as to the marketing of new issues, while a firm in this line also analyzes production, prices, distribution, and stocks in various industries as related to the values of securities in those industries. Another investment-banking concern compares the statistics of various industries as a means of directing its capital into profitable channels, while an investment and brokerage house studies business trends in order to make recommendations for investment and speculation. The investment department of a trust company uses as indicators of prospective net profits of companies the statistics of general business activity and the differential between production costs and selling prices of the commodities produced; these data, together with money rates, are used as indicators of the prices of investment securities.

### INSURANCE

A life insurance company watches rental advertisements to see whether or not cities in which the company is lending money are overbuilt, while statistics on agricultural products indicate the conditions in the agricultural section where the company places loans. Another life insurance company plans its sales campaigns according to the

statistical trends of the various industries and localities, while another uses statistics to disprove the alibis of unsuccessful salesmen. The volume of business of a fire insurance company has been found to vary directly with general prosperity, and its losses vary inversely thereto. General business trends are studied by an insurance company from data on savings deposits, distribution, construction, money in circulation, etc. Another insurance company uses figures on automobile production to forecast the probable business in automobile insurance, especially for finance companies; in industries where many failures are seen to occur, investigators are instructed to take special care.

### LAW

Business trends, as shown by current statistics, are watched by a lawyer in order to see whether it will pay to wait several years before obtaining judgment on a case or to settle for half the amount immediately and be able to bank the proceeds at once. Another lawyer watches current business statistics to ascertain whether the fluctuations in the business of a particular firm are due to general conditions, conditions within the industry, or conditions within the particular firm. A firm of lawyers watches the growth of various businesses for indications of new financing requirements.

### TRADE AND COMMERCIAL ORGANIZATIONS

A chamber of commerce uses current business statistics as chart material and to compare with data for its locality or district. Another chamber of commerce prepares statistical analyses of business trends over a period of time, while a third uses such data to publish regularly in bulletin and magazine form. A real-estate board uses current figures in estimating the progress of business for its members, while a young men's association finds statistical data useful for distribution in its reading rooms.

A trade association in the coal field judges coal consumption through statistics of employment and production in industries which are large consumers of coal. An association of manufacturers of sales books finds that their data can be advantageously compared with statistics of newspaper production and with various classes of retail trade. Another trade association uses comparative business figures in reports for tax legislation, while a typographical union makes frequent use of living costs, wholesale prices, and building statistics.

### EDUCATION

In a graduate school of business administration the students analyze various series of business statistics in order to obtain trends, seasonal

variations, etc., for theses. Another college of business administration uses the current statistics to keep its wall charts and textbook material up to date as well as for general reference in classes. A college of commerce uses such figures in teaching industrial organization and movement, while another such college uses them in problems assigned to students. A college bureau of business research uses such statistics in the preparation of indexes of production, consumption, etc., while another computes trends of various industries. The department of economics and sociology in a college uses statistics extensively in courses in economics, business cycles, etc.

An agricultural college uses current statistics in planning farm programs on the college farm; while another finds them valuable as material for faculty speeches, as the basis for graphic charts by students, and as data for research work. Another university uses these data in courses on agricultural economics, while a university extension division utilizes them in the preparation of business bulletins and in answering requests for information.

In the department of education in a college, business statistics are used in classes training teachers for high-school positions, as sources of information and as illustrating the use of graphs and the methods of gathering data. A library also finds that collections of current statistics, such as the Survey of Current Business, supply the demand of readers for examples of business graphics. A large library places current copies of periodicals such as the Survey of Current Business in magazine racks, while duplicate copies are loaned to business men for more leisurely reading.

A school superintendent uses statistics on business costs to keep in touch with the school-building program and uses statistics on living costs in order to measure the fairness of teachers' salaries. A correspondence school in the electrical field reconciles through statistical data the business trend of industries affecting electrical work, while a correspondence school finds current statistics of value in selling its educational services.

### GOVERNMENT

Collections of current statistics, such as the Survey of Current Business, are used by various officials in the Department of Agriculture for bulletin material on the agricultural situation, for informing farmers about industrial conditions, and to judge the trend of industry and its effect upon agriculture. The effect of the business situation on highway construction is studied by the Bureau of Public Roads of the Department of Agriculture.

The Treasury Department is enabled to forecast income and other tax returns from data on current business conditions, while the Post

Office Department compares its figures with those of other business indicators. Changes in manufacturing and construction costs are determined through current statistics in appraisal work in the Treasury Department, while the General Accounting Office watches business trends in connection with its audit of the money-order business.

Officials of the Department of Commerce make constant use of business statistics to follow the trends of various industries in connection with studies on simplification, foreign trade, domestic distribution, transportation, marketing problems, utilization of materials and products, and general business conditions. The Secretary of Commerce uses these data regularly as the basis for remarks on business conditions at Cabinet meetings, press conferences, and interviews with business executives.

The War Department charts various business indexes and distributes them to the different supply branches to indicate commodity price trends, while the Navy Department uses the figures in purchasing and in preparing a catalogue of property. The Interstate Commerce Commission watches the effect of economic trends on the railroads. A Congressman reports using such figures for legislative purposes and the Department of Labor compares the trends with its monthly industrial surveys. A Government employee reports using figures on business trends as indications of the most advantageous time at which to buy or build a home.

#### MISCELLANEOUS

A piano-manufacturing concern prepares a cost index of department-store sales, chain-store sales, and savings deposits as a forecaster for the output of the piano industry. A manufacturer of insulation materials checks business trends to find out if business expansion is due to the normal increase, to work previously deferred, or to speculative operations. An optical manufacturer correlates his own business not only with that in optical goods but with data on automobile production, iron production, and unfilled steel orders. A fur manufacturer correlates his business with general index numbers and chain-store and mail-order trade. A mail-order house circularizes where current statistics show conditions are best. A geologist found that a study of general economic conditions actually influenced him to buy stocks for personal investment at low points and to sell them at high marks. A physician watches production, unshipped orders, and interest rates as guides to business trends and the security markets. A manufacturer of abrasives watches the statistics on automobiles, machinery, furniture, and stone and glass goods to find the best markets for his goods, and studies of those industries influence his policies in expansion and retrenchment.

### III

## HOW TO INTERPRET THE FIGURES

**SUMMARY.**—The statistics of manufacturing are most nearly complete and can be applied, with variations, to agriculture, mining, and wholesale and retail trade. For one's own industry, many possibilities of interpretation are presented for production, capacity, employment, shipments, consumption of materials, stocks of materials, stocks of finished goods, orders accepted, cancellations, unshipped orders, inquiries, imports, exports, and prices. The application of these principles to statistics of material markets and distributive markets is described, as well as the general business indexes and statistics usually considered in studying the general business situation.

The principal current business statistics collected by trade associations, Government departments, or other organizations for an industry or commodity are those relating to production, capacity, shipments, stocks, orders accepted, cancellations, unshipped orders, employment, imports, exports, and prices. Each of these may be further classified into details, which will be treated separately under the individual items. The figures are generally of the greatest usefulness if given in quantity units, such as tons, barrels, pieces, etc., instead of in values, which fluctuate widely with price changes and thus often obscure the real movement of the commodity.

### STATISTICS OF ONE'S OWN INDUSTRY

Most of the available current statistics relate to manufactured goods and are compiled from reports of manufacturers. This is due not only to the large part which manufacturing plays in our economic life but to the organization of manufacturers into many industrial groups, facilitating the collection of statistical data. On the other hand, difficulty has been experienced in securing adequate statistics by commodity lines once the articles have passed beyond the manufacturer's door and have entered into wholesale and retail trade. Furthermore, the statistics used in manufacturing industries include practically all the items found in any other lines, and so the principles employed in the utilization of manufacturing statistics can well be applied to other branches of commerce. Therefore, in the discussion of the interpretation of statistics, manufacturing is generally thought of, but the reader can easily apply these principles to his own line, with the special applications noted below.

Producers of raw materials, such as farmers, stock raisers, lumbermen, and those engaged in extracting minerals from the earth, can apply to themselves the principles set forth for the use of manufacturing statistics of one's own industry, so far as they relate to finished goods, for their products, though raw materials for the manufacturers, are finished goods so far as they are concerned. The raw-material producers themselves do not have to consider their supplies in most cases, because they are already present, to be taken from the ground whenever necessary; neither do they have statistics relating to new orders, unshipped orders, and inquiries. Farmers, however, do have to provide their crops and can decide which crop to plant, but this is done once a year, and when done can not be changed until another planting season comes around. In crop farming there is no monthly production, the output being available annually.

At his planting time the farmer can study the supply of and demand for the crops which he normally plants, on the basis of statistics of production, consumption, stocks, prices, etc. The Department of Agriculture issues reports on "intentions to plant" for some crops which show the farmer what the rest of the country is expecting to plant, just as orders accepted show a manufacturer what other manufacturers may be expected to produce. With these various data at hand, the farmer can estimate which crops will net him the greatest return for the coming year. The consideration of economic conditions, as well as soil, weather, and crop-rotation conditions, will tend to prevent oversupplies in some crops and undersupplies in others and to secure a more stable price year by year.

In wholesale and retail trade, sales figures alone are usually available, though data on stocks are now compiled for department stores and wholesalers. As the trade figures are on a value rather than on a quantity basis, the data for these lines are not as satisfactory as for manufacturing. Sales figures in wholesale and retail trade represent a combination of orders, production, and shipments as applied to manufacturing, for the ordering and shipment of goods in trade are usually simultaneous. These data are discussed under "Shipments." The sales figures thus represent both the demand of consumers and its fulfillment. This lack of advance orders precludes the forecasting of shipments of goods from conditions in the particular trade, although these figures are of great value in showing the changes in that trade. So the wholesaler looks primarily to retail trade for his advance indicators, and the retailer looks to general prosperity indicators.

#### PRODUCTION

Production statistics of an industry show what is being added to the general supply of its products. They represent the actual meas-

urement of operations and generally reflect the prosperity of the industry. The proper regulation of production plays an important part in the success of a business, since too large production may leave unsold stocks on hand, which can only be disposed of at a sacrifice, while too small production will result in loss of opportunities for sales and profits. Through production statistics, the proper adjustment of a firm's production can be made.

Current production figures are sometimes presented merely as a total, but in many instances are classified according to the principal types or classes of product or by geographical divisions. Occasionally, where the product is highly diversified, as in the textile industries, production is measured by the consumption of raw materials or by the activity of the machinery rather than by actual quantities produced. Production statistics have been used by manufacturers in the following ways:

1. Comparing present production with previous months or with monthly averages of previous years, the trend of production is discerned for the industry, and its course is studied for evidences of a change in direction. Seasonal changes, such as occur in cement manufacturing or flour milling, where the normal output varies considerably according to the season of the year without regard to business conditions, must be allowed for in such studies. In such cases the true trend of the industry is best seen in comparison with the corresponding month of the previous year or an average of such corresponding months.

2. The normal seasonal movement of the industry averaged over a series of years is often plotted on a chart and the current year's output plotted against it. Thus, any divergence from the normal seasonal trend may be seen at a glance. Many trade associations, in industries where seasonal conditions predominate, show their production figures in this manner. (See diagram 1.)

3. The percentage which the production of one's particular firm forms of the total for the industry shows at a glance the firm's position in the industry, and any change in that ratio will show whether the firm is gaining or losing in proportion to the rest of the industry. This relationship is often shown by plotting on a chart the grand totals in comparison with the individual company's production, the latter being adjusted in accordance with its normal percentage relationship to the total, or else both being shown as relatives of some comparable period. This is a very popular use of production figures by executives, as it tells them exactly how they stand as compared with their competitors. Many trade associations, such as the American Walnut Manufacturers Association, furnish their members with



charts on which both their individual figures and the combined totals for the industry may be plotted for comparison. (See diagram 2.)

4. When production figures are available over a period of years, the normal growth of the industry can be ascertained. This growth trend can be used to calculate future possibilities in the industry.

DIAGRAM 1.—AVERAGE SEASONAL MOVEMENT COMPARED WITH ACTUAL FOR ONE YEAR

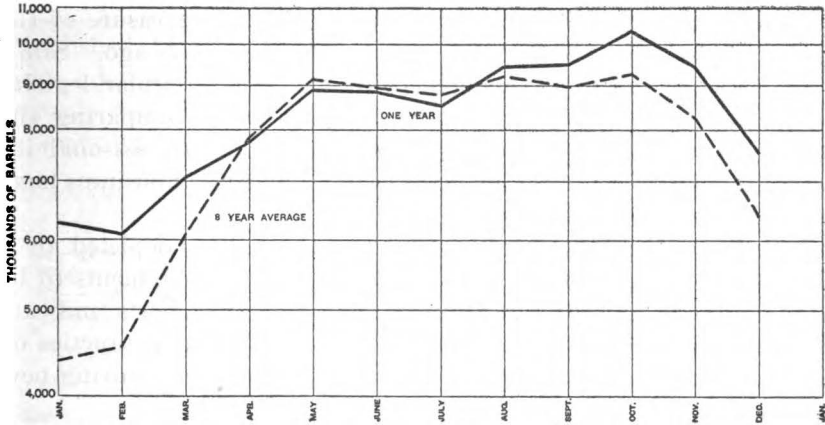
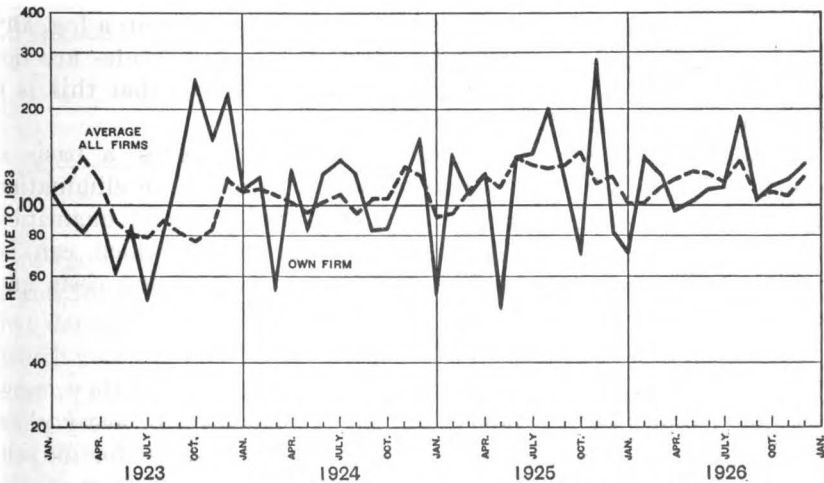


DIAGRAM 2.—AVERAGE BUSINESS, ALL FIRMS COMPARED WITH TOTAL FOR OWN FIRM



Any firm can figure what its production will be several years hence, provided it maintains its proportionate share in the industry and the trend of the industry is not altered. Thus, it can make plans in advance for such expansion as may be necessary. Of course, the normal growth might be different in the future, but allowances can be made for any known factors likely to affect it.

5. Comparison of the production figures with those of competing lines will show which are forging ahead in the race for popular favor. The more swiftly advancing line will be encouraged to develop its resources, while the slower lines will need further efforts to hold their share of the business or will require changes in production or merchandising policies.

6. Production statistics are also used to measure the effect over a period of time of such influences as cooperative advertising. A case in point is their use by the paint manufacturers as a measure of the success of the "save-the-surface" campaign a few years ago. Similarly, the effects of tariff changes, price changes, particular legislation relating to the commodity, etc., are shown by comparing the period before the change with that after it, provided seasonal influences are allowed for and no great changes in general business have vitiated the comparisons.

7. Except where stocks are being accumulated or depleted to a large extent, production indicates the magnitude of shipments to be made in the near future. Similarly, production reports indicate prospective employment conditions, owing to the general practice of producing as much as possible with present forces before hiring new employees.

8. Where production is shown by grades, as in the lumber industry, the percentage each grade forms of the total can be compared for the individual plant and for the industry as a whole. As there is a wide variation in the possible proportion of grades in a log, any company finding that its percentages of the higher grades are not measuring up to the average of the industry knows that this is a weak spot demanding immediate attention.

9. Where production is shown by sizes and grades, a basis is afforded for a study of simplified practice, through the elimination of those sizes and grades which are produced in small quantities. The industry can then concentrate on the goods which can be made in greater volume and thus reduce manufacturing costs and inventories.

#### CAPACITY

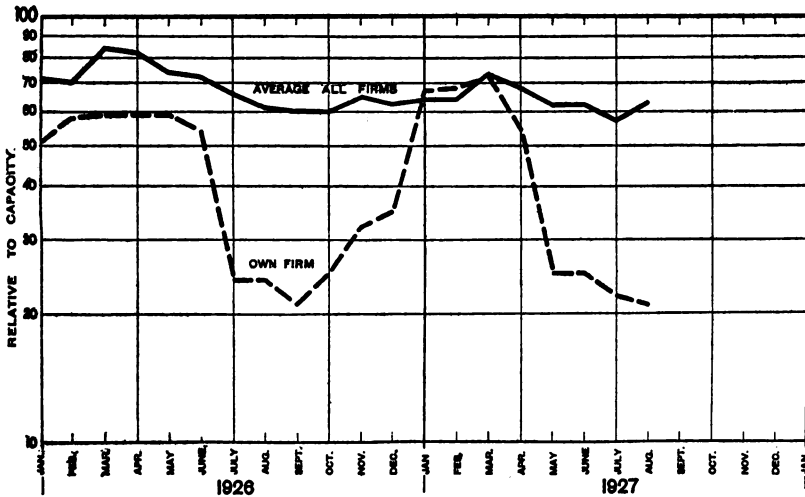
Capacity figures are closely related to production, for they measure the possibilities of production. The management of every plant should know its capacity, based on a uniform definition for its particular industry, as discussed in Chapter IV. In this manner proper comparisons between its efficiency and that of the remainder of the industry can be made. These figures have been used as follows:

1. The relationship between production and capacity at any given time indicates the extent to which production can still be increased without resorting to plant expansion. An individual firm may be

working its plant at capacity and may be desirous of expanding, but, if the industry as a whole were shown by statistics to be busy at only a fraction of its capacity, individual expansion might not be warranted.

2. The capacity figures are used to clarify production statistics by showing the relationship of present to possible production. Steel production at present, for instance, is very much larger than before the war, but the steel manufacturer is more interested in its relation to the war-increased capacity of the industry. With that relationship established, he can compare present activity with past activity on a more adequate basis. The American Iron and Steel Institute has recently made available such capacity figures, both for a theoretical capacity and for a practical capacity. (See diagram 3.)

DIAGRAM 3.—PRODUCTION RATIO TO CAPACITY: AVERAGE FOR ALL FIRMS COMPARED WITH OWN FIRM



3. Capacity is related not only to actual production but to the demand for an industry's products. Production may be near capacity, but demand may be either at about the same level as production, in which case any increase in capacity may not be warranted, or demand may be greater than capacity, because of supplies being obtained from other sources. In this latter case expansion might be advisable. On the other hand, demand as shown by consumption of the commodities by consuming industries might be far below capacity, and this would indicate to the manufacturers of the product that the high-cost plants had better be scrapped or put to other uses, since they would have no chance to operate except under the most favorable conditions.

4. Relationship to capacity is used extensively by trade associations and by their members to compare production statistics for two differ-

ent periods when a varying number of firms report. If 20 manufacturers report one month and only 15 the next month, with some of the 15 firms not reporting among the 20 in the previous month and thus precluding a comparison based upon identical concerns, a comparison of the total production in each month would mean little. The reported totals might show a decline, whereas the actual condition might be the reverse. By obtaining the total capacity of all reporting firms each month a percentage relationship of production to capacity is established for correct comparison of the trend of productive operations.

#### EMPLOYMENT

The employment of labor is carefully considered by business men, for it must be large enough to produce or handle the goods properly and small enough to leave a margin of operating profits. Wages form one of the heaviest items of expense in most lines of business, and thus their proper regulation is essential to business success.

Employment is usually indicated either by the number of persons employed at a certain pay-roll date in the month or, where more detail can be given, by the number of man hours, representing the total time of employment of all wage earners during the period. Data as to the total pay-roll payments for the period are often presented. The principal uses of employment figures are as follows:

1. The general trend of employment in an industry shows whether it is taking on or laying off workers and particularly whether employment trends are following production trends, as is normally the case. Seasonal conditions should, of course, be allowed for. In localities where a particular industry predominates, such as rubber manufacturing in Akron, Ohio, the employment figures of that industry give merchants an indicator of the prospective buying power of the community in the near future.

2. Where production and employment are reported by the same firms and these firms produce only one kind of goods, dividing quantities produced by men employed gives the approximate average output per man. This average not only gives a line on the increasing efficiency of output for the industry over a period of time but, in comparison with similar data for competing industries or for the individual firm, has been used to reveal the weak spots in the productive organization.

3. The seasonal variation of employment in a particular plant is compared with the entire industry by reducing each month's employment to a percentage of the year's employment. It may be found that the particular firm's employment is at too great a peak at certain seasons and too low at others, thus resulting in too great a labor turnover and capital investment. Some manufacturers in distinctly seasonal industries have looked around for other products which

could be made in the dull season. The suitability of such products is determined by examination of the seasonal trend of production and of employment over a period of years. If these seasonal trends are about opposite to those of the present product, their combination would give the plant a stable business the year round.

4. In locating manufacturing plants with seasonal employment the seasonal trends of employment in the industries already located in a particular city or section are considered. By choosing places where the predominant seasonal employment is different from its own trend, the new firm can escape bidding for labor at the peak of the rush season and leaving the wage earners in a precarious position in the slack seasons.

5. Pay-roll data divided by units of product determine roughly the pay-roll cost per unit. With this ratio, individual manufacturers can compare their own operations in this respect with those of the industry as a whole, and thus determine the relative efficiency of their plants. These data are extensively used by the members of the National Association of Paper Box Manufacturers to check up on their efficiency in this respect.

#### SHIPMENTS

While production figures measure plant activity, statistics of shipments show the disposition of the products, since goods shipped from the plant are on their way to consumers, whether for use in further manufacture, in storage, or in wholesale or retail distribution. As consumption is usually fairly regular, shipments in most industries are more regular, month by month, than production, which may often outrun demand for a short period and then have to recede until demand catches up. Large and regular shipments are desired by managements, since in this manner goods are billed and payment can be received, while stocks are kept down.

Like production, shipments may be classified geographically and by types or classes. The classification by districts in which the goods are produced, which is the only geographical classification possible for production statistics, is not nearly so important in shipments as the classification by district of destination of the goods shipped. Sales of wholesalers and retailers correspond to shipment figures of manufacturers, since in trade the goods are usually ordered and shipped simultaneously. Data on shipments present the following uses:

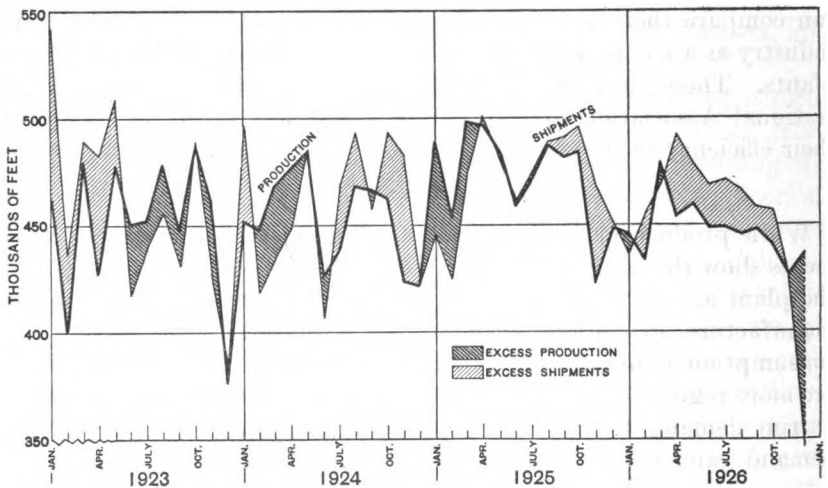
1. Shipments indicate the consumption of a product better than production, because they are nearer to the consumers, and they disregard production for stock. The shipment data are therefore studied as showing the consuming power of the country for the product in question, particularly in comparison with previous periods.

Through these studies, manufacturers and distributors are enabled to project forecasts of future consumption. Where exports are an important factor, shipment data are often divided as between domestic and export, but the increasing detail given in the official export figures has lessened the need for supplementing these figures.

2. Shipment data are also used to determine the seasonal variation in consumption, thus permitting the intelligent regulation of production to synchronize with consumption. A zinc company reports using the figures in this way.

3. Comparison of shipments with production shows whether the industry concerned is producing more or less than consumers' requirements, according as production is greater or less than shipments.

DIAGRAM 4.—PRODUCTION COMPARED WITH SHIPMENTS



In many industries, such as cement manufacturing, there is a definite seasonal relationship between production and shipments, which should be taken into account in interpreting the figures. Such relationships can be discovered by comparing the data over a period of years. A graphic comparison of production with shipments on a chart consists in shading the space between these curves wherever production exceeds shipments, and using a contrasting type of shading when shipments exceed production. As shipments and production must be practically equal in the long run, any appreciable excess in production should be the signal that output has outrun consumption, while a deficiency in production should indicate, unless stocks are high, that increased output may be absorbed in the near future. (See diagram 4.)

4. When shipments are presented by States or districts of destination, the manufacturer can see where the industry is shipping its

goods. The American Walnut Manufacturers Association, for instance, issues a quarterly summary dividing the United States into 25 or 30 market areas and showing the exact quantities of their product shipped into each market. As an official of the association remarks: "This information in a general way keeps us posted as to the tendency in the various localities and promptly advises us if our material is gaining ground, standing still, or slipping."

5. Comparing the shipments by districts gives an indication of the relative importance of each district, so far as consumption of the particular product is concerned. The more important districts, thus revealed, are usually made the basis of the most intensive sales campaigns. In using these statistics by districts great care should be taken that they be representative of all sections of the country, for otherwise they will be misleading. If, say, 20 per cent of an industry's capacity is lacking from the statistics, this would have little effect on the trend of the total, for 80 per cent of the industry would be quite representative. However, if the missing 20 per cent included most of the manufacturers in a particular district, who would naturally ship heavily into their immediate neighborhood, the shipments into that district would be shown as relatively much smaller than the actual amount.

6. Shipments by districts not only allow comparison of the actual shipments into each section of the country, as pointed out above, but are used to show the relative progress of the various sections in the use of the particular product. The largest consuming district might, for instance, be the least productive of extra sales effort, because of being closest to the saturation point, and a chart comparing the relative progress of each district might show that some of the smallest consuming districts were making the best progress. Furthermore, such statistics, read in the light of other information, might show temporary conditions of especially good or bad business in particular sections which would be useful in planning sales campaigns.

7. Manufacturers and distributors have used these shipments figures by districts to compare with their own figures to ascertain what proportion they are obtaining of the business of their own districts in which they are most favorably situated, and to what extent it might be advisable to concentrate more on those districts.

8. Shipment, or occasionally production, statistics are often used by trade associations as the basis for dues, in order that the dues may be proportionate to the business done by each member.

9. Comparison of production figures on various items with the relative distribution of those items, as shown by shipments, indicates to which items manufacturers may devote their attention as undersup-

plied. The manager of a softwood lumber mill, for instance, watches these statistics to find out what items are running beyond consumption and does not take a chance of sawing such lumber and allowing it to go into stock because of lack of demand.

10. The sales of retailers, which correspond to shipments of manufacturers, indicate the buying habits of consumers, and any changes in retail buying habits will be immediately reflected in the orders of retailers from wholesalers. Seasonal trends in retail sales should, of course, be allowed for in such comparisons, just as in the seasonal manufacturing lines.

11. Competition between retailers of various lines can be seen from the relative sales of those lines, such as between tobacco and candy, for instance. Present statistics, however, are not usually classified into enough detail to permit comparisons by particular commodities but only by large groups of articles sold by the same class of stores, such as drugs, dry goods, shoes, etc., although a beginning has been made in the classification by lines in department-store trade by the Federal Reserve Board. Care should also be taken in comparing chain-store statistics to allow for the addition of new stores, which would increase the totals more than the actual increase in business. An average per store is often the best means for overcoming the effect of this artificial increase.

#### CONSUMPTION OF MATERIALS

As mentioned above, production of goods is often measured by the consumption of the principal materials used in their manufacture, but occasionally both production and consumption statistics are available for an industry. In such cases additional information has been made available to manufacturers through figures on consumption. Naturally, a manufacturer wants to consume as little as possible to cut down expense and to consume the cheapest materials consistent with proper quality of his product. In this endeavor manufacturers have used consumption statistics as follows:

1. Consumption of materials compared with production will show the ratio of raw materials used to each unit of product, such as the number of bushels of wheat used per barrel of flour or tons of waste paper used per ton of box board produced, etc. Any change in these ratios will show the extent to which the industry is becoming more or less efficient.

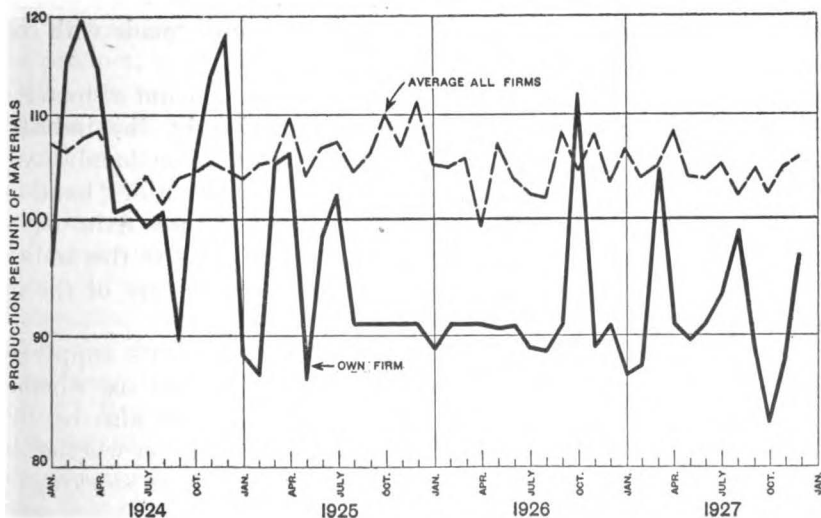
2. Any individual manufacturer can compare his own ratio of material to product with the industry's ratio and thereby test the efficiency of his plant. A chart showing both ratios over a period of time will show up his progress in that direction in a concise manner. (See diagram 5.)



3. Where more than one product is involved, the ratio of production to consumption may show not only efficiency but a change in relative importance from one product to the other, such as the larger extraction of flour from wheat, during the war-time regulation period, at the expense of mill feeds, or the recent increase in the proportionate return of gasoline from crude petroleum at the expense of the other refined products.

4. Where more than one material is used in making a product, the changes in ratios between the materials will give an indication of which materials are growing in demand. This knowledge may help the manufacturer in making the proper proportionate purchases in the future, as well as indicate the possible price trends in each

DIAGRAM 5.—RAW-MATERIAL RATIO TO PRODUCT: AVERAGE FOR ALL FIRMS COMPARED WITH OWN FIRM



material in future, for a decided increase in the use of a particular material will be likely to lead to increased prices. One of the important comparisons in this category is the relative proportion of pig iron and scrap iron going into steel production. This proportion, which depends upon relative price levels, has a distinct bearing upon the demand for pig iron.

#### MATERIAL STOCK

Although statistics regarding the industries supplying materials will be described later, the stocks of raw materials in the hands of consuming manufacturers are part of the picture of conditions in these manufacturing plants and therefore their material stocks are treated here. A manufacturing plant or a dealer purchasing for

resale does not want to tie up any more money than is necessary in carrying stocks of raw materials, and yet enough must be carried to insure continuous operation of the plant or sales agency. This adjustment of stocks has been obtained by many business men through the following uses of these statistics:

1. Figures of manufacturers' stocks of materials indicate the extent to which an industry is supplied with its raw material. These data, taken in connection with figures on unshipped orders, give an idea as to whether there is likely to be a large demand from this industry for materials in the near future. Such a demand would be likely to bid up prices, while large stocks on hand would mean that manufacturers would be out of the market for some time. Allowance should, of course, be made for seasonal influences on the amount of stock carried, particularly in the case of crops, such as sugar cane and wheat, the bulk of these being received at the mills or refineries in a few months following harvest. In such cases comparisons can be made with corresponding dates of previous years.

2. Where consumption figures are available, the amount of material stock divided by the average daily consumption by the industry indicates the number of days' supply of materials on hand. Any changing practices in purchasing, such as the adoption of "hand-to-mouth" buying, can be shown by comparisons of these data over a long period, while the stock figures alone might not give this indication, owing to the gradual growth of stocks to take care of the increased production of the industry.

3. Any manufacturer may compare his average day's supply of material stock with the average for the industry and see whether his policies in this regard are conservative. He can also by this method of comparison over a period of time check up on whether he has done better or worse than the rest of the industry in stocking up in the past in anticipation of price increases.

4. Material stock may often have an influence on the output of the manufactured product. For instance, production may be increased at times beyond the proper demand merely to work off large material stock while production costs are cheap and to replenish the manufacturer's supply of materials at the low prices induced by the large outstanding supplies. In this case the addition of low-cost goods may compensate the manufacturer for the additional storage of his finished products, especially if he believes demand will increase later and he desires to keep his force fully employed.

#### FINISHED STOCK

While material stocks held by manufacturers are largely under their control, being increased through purchases and decreased through production into finished goods, finished stocks can not be

decreased at will, as this depends upon shipments resulting from sales. Particularly since 1921, when unsalable stocks overhung the market for a long time, stock accumulation has been watched by manufacturers with trepidation. On the one hand, too large stocks are feared not only because of the extra carrying charges and tied-up capital but also because of the possibility of losses through price slumps, while too small stocks, on the other hand, will prevent a manufacturer or dealer from giving the service which customers require, and will thus result in loss of both sales and good will. In many lines the stocks held by the industry will not tell the whole story, because dealers' stocks might show a different condition. This factor is discussed further under "Statistics of distributive markets." Stock statistics are often divided as between grades, classes, etc., and, in general, have been used as follows to obtain the delicate adjustment necessary for proper inventory control:

1. Increasing stocks at a high level indicate lessened demand for the product, or at least a demand less than the production. In such a situation manufacturers will naturally try to cut down their production schedules until the overhanging stock is disposed of. On the other hand, if stocks in the industry are low, manufacturers will increase production in order to have goods on hand to share more fully in the indicated increased business, particularly if such stocks can be accumulated at low cost. Any regular seasonal tendencies should, of course, be allowed for in calculating the trend of stocks. A manufacturer of paving brick who acted on stock statistics according to the above principle found that he secured additional business from being in a position to supply what other manufacturers were out of. Woolen manufacturers who, previous to the inauguration of statistics, believed that practically no stock was carried in the industry discovered after statistics were inaugurated that large stocks were being held; and they immediately took effective measures to decrease stocks to a modest figure.

2. Stocks divided by average shipments will show the average time in months required to work off present stocks at the normal rate of consumption and in this form can be more readily compared with data for prior years for industries in which there has been a greatly enlarged production, such as the petroleum industry. In such a case the large increase in stocks would not necessarily be dangerous, unless the average stocks, expressed in days' or months' consumption, were greatly increased. But when, as was revealed by the statistics of a trade association some time back, stocks in the manufacturers' hands are equal to two years' consumption at the current rate of shipments, a danger signal is given at once that prices are likely to fall and that large production is inadvisable. The zinc industry has found its

stock statistics invaluable in reducing stocks to a point where they are, to say the least, not endangering the price factor, according to the American Zinc Institute.

3. As in the case of material statistics, the data on finished stocks for the industry as a whole, when divided by shipments, are used by individual manufacturers for comparison with their own averages. In this way each manufacturer can tell whether he is overstocking, as compared with the rest of the industry, or understocking. He can also, as in the case of raw materials, check his own past guesses on stock control with later events, such as prices and consumption, and see whether his own or his competitors' policies were best.

4. If available by geographic divisions, stock statistics often show how conditions in a particular district differ from those in the country at large. Knowledge of such conditions is especially valuable in the case of a relatively heavy commodity, such as brick, which can not be moved economically from one section of the country to another, owing to the high freight rates in relation to its manufacturing cost. Manufacturers on the Pacific coast, for instance, might have low stocks and an incentive for greater production, while Eastern producers might face the reverse conditions.

5. Stock figures by grades and sizes are of great value in disclosing excesses of supply that might occur in one grade and not in another. For certain sizes of rubber tires, for instance, relatively large stocks might be available, which would tell the manufacturers to go slowly on production of those sizes for the time being and to concentrate on the sizes of which stocks were low, relatively to the demand. The rubber-tire statistics, classified by sizes, have, in fact, been given credit for the recovery of the tire industry from the overproduction in 1922. Similarly, in the lumber industry, many firms report that they modify their manufacturing practice when they see that certain items are overproduced.

6. If stocks are divided as between sold and unsold, the exact amount of surplus goods which must be disposed of can be ascertained. The proportion of stocks unsold can also be compared over a period of time to ascertain the industry's progress in this respect and the extent to which manufacturers have produced merely for stocks as against production on actual order.

7. Stocks of department stores show the extent to which these stores are stocked with goods on a value basis. Here, again, seasonal conditions must be taken into consideration and the principal comparison made with the corresponding month of the previous year. Department-store stocks in October and November of each year, for instance, show the preparations being made by retailers for Christmas trade, while stocks at the end of December show the ex-

tent to which the holiday buying came up to expectations and also indicate the probable purchases from wholesalers during the forthcoming months.

#### ORDERS ACCEPTED

The previous items have covered the physical aspects of the manufactured goods or their raw materials, but before goods can be produced plans are made for their production, and these plans depend upon orders. Orders are what business thrives on, so every firm tries to increase its accepted orders unless it finds that it is unprofitable to obtain them through too high selling costs, too high production costs, excess costs of distribution, or unsound credit conditions. Statistics of orders accepted during the week or month have helped business firms to regulate their policies better through the following uses:

1. As production must precede shipments, and thereby the production curve in a measure forecasts the shipments of finished goods into consumption, so the receipt of orders anticipates and in a measure forecasts the output of goods. The figures on orders, however, will vary more widely than those on production, just as production generally varies more than shipments; and thus orders become a sensitive barometer of future output. Many executives wait for an upturn in accepted orders after a decline before stocking up with finished goods, in order to make sure of increased demand for their product.

2. Orders accepted are probably the best business barometer now in general use, because they reflect business sentiment exactly. Production figures for any particular month may reflect orders accepted some months previously, and shipments, in turn, may comprise goods produced at some previous time, but orders register immediately the thoughts of consumers that it is time to buy. Furthermore, production and shipments in any one month are practically limited by plant capacity and railroad facilities, respectively. There are, however, no limits on orders, unless individual companies refuse to accept bookings after having filled their productive capacity for several months ahead; but, even in this case, the orders are likely to go to other companies and still appear in the combined totals for the industry. Thus, order figures give executives a feeling of the pulse of demand for their products, indicating the policies to be pursued as to price changes, sales methods, etc.

3. Figures on orders accepted are particularly useful in foreseeing times of crisis. Unshipped orders may be high, owing to a large accumulation of old orders, and stocks low, a normally good condition; but the first decline in accepted orders may be the signal for a

depression, as in 1920. Stocks would then increase on account of the cancellation of orders.

4. Comparison of the individual firm's orders with those of the industry will show immediately whether it is obtaining its proper share of the business, based on output in the previous year, or an average of earlier years. If a firm's orders should decline for a few months but still maintain their proper relationship to the combined totals, the decline can not be attributed to any defect in the firm's sales force or policies, but rather to general conditions. In the face of such statistics, indicating that little business was available anyhow, many executives are restrained from price cuts which otherwise might be made if it were thought that others were getting more than their share of the business. A decline in the combined orders but a gain in the firm's orders would give warning of possible general declines for the industry which the temporary gain in the firm's own figures would not reveal. On the other hand, an increase in business, at a slower rate of increase than for the industry as a whole, might give cause for investigation of sales and price policies. This ratio, like the ratio of the individual company's production to the total, is often plotted on a chart to give a clear conception of this important relationship at a glance.

5. Accepted orders for an industry can be compared with production and shipments to ascertain whether demand is above or below productive activity or consumption deliveries. Care should be taken, of course, to allow for seasonal conditions in the receipt of orders which might be different from the movement of production and shipments, as in the case of certain steel products, where heavy contracts are usually closed with the railroads at the beginning of each year. Charts comparing orders with production or orders with shipments, using contrasting types of shading to indicate the respective excesses, show such conditions in a graphic way, as does the chart suggested for comparison of production and shipments.

6. Total accepted orders for the industry each month are also used by sales managers as the basis of an effective sales quota, the firm's quota being based on its normal share of the total for the industry. By using such a varying total as a quota, which will fluctuate according to business conditions, good salesmen are not penalized when business in the industry is poor. Furthermore, inefficient salesmen are not allowed to slacken their efforts when business can be obtained easily, for in such good times the quota automatically rises.

7. In a few industries, where accepted orders are presented by geographic divisions—that is, the districts in which the buyers are located, not necessarily those where the manufacturers or distributors are located—a picture of demand by districts can be obtained and

plans may be made immediately to push sales into those districts showing the most progress. Although order figures, being more irregular, are a less reliable measure of consumption in each district than shipments, their early availability, through anticipating shipments by a month or more in most cases, enables the manufacturer to use them to foresee changes in trend at the earliest possible moment.

8. The distribution of accepted orders by districts helps to check up on the activities of salesmen. The American Walnut Manufacturers Association presents such figures and its secretary thus comments on their use: "It destroys the alibi of incompetent salesmen in certain territories. Before this report was made a distant salesman would explain failure to obtain business by reporting that there was absolutely no buying in his district. To-day, if he comes in with such a story and his home office discovers that buying has been active in his district, there is strong probability that an incompetent salesman will be looking for another connection."

9. Where accepted orders are given by grades or sizes, it is also possible to foresee changes in demand or style before goods get into production, thus enabling the manufacturer to concentrate on the lines which are shown to be most popular throughout the entire industry.

#### CANCELLATIONS

Under ordinary conditions cancellations are likely to be light, being merely incidental deductions from new orders, due to changes of plans or correction of slight overordering, and are similar to returns of shipped goods which have proved unsatisfactory. With remembrance of the heavy cancellations in 1920 and 1921, however, which indicated a sudden lack of confidence in the business future, many industries are compiling these figures to avoid repetitions of such conditions. These statistics have been used as follows:

1. Cancellations by themselves will indicate, by any marked increase, the tendency of customers to restrict purchases through lack of confidence in business conditions. These figures, taken together with declining orders, may give the signal for avoiding commitments and restricting production.

2. An even better picture may be obtained by relating cancellations to orders. Increasing business may tend to increase those cancellations normally met with in the course of ordinary business transactions and, standing alone, such an increase might appear dangerous. However, the ratio between cancellations and orders accepted will show the situation in its true light.

3. Any individual manufacturer may compare the percentage which his own cancellations form of his orders with the corresponding percentage for the industry at large and determine whether his cancellations are larger than they ought to be.

#### UNSHIPPED ORDERS

As the physical stocks carried at the end of any month show the current result of the productive and shipping operations of the plant, so unshipped orders at the end of the month show the net result of the acceptance of orders and their fulfillment through shipments. As one commentator puts it, "They constitute the index of unsatisfied demand." Industries aim to have a good amount of unshipped orders on hand so as to keep production continuous even if accepted orders should slump temporarily. On the other hand, too large unshipped orders in relation to the productive capacity of the plant may mean inability to deliver goods on time and therefore loss of business to competitors. Statistics of unshipped orders have been used as follows in the effort to regulate the flow of business systematically:

1. Unshipped orders indicate the extent to which the production of the industry is contracted for in the future. Large unshipped orders generally show that the industry is in healthy condition and that in many cases manufacturers can afford to take on new business only at an increase in prices. On the other hand, if an individual manufacturer's books are well filled with forward business, but the industry as a whole is not so fortunate, he can not increase his prices, as the other manufacturers would underbid him to secure the business which they greatly need. A decline in unshipped orders usually signals greater competition for business.

2. Unshipped orders, when compared with accepted orders and shipments, often present a better picture of conditions, for, if they are high and accepted orders and shipments low, as was the case in the steel industry early in 1921, the unshipped orders are merely book orders with shipping instructions purposely delayed or awaiting cancellation. On the other hand, steel unshipped orders in the latter part of 1926 were lower than in early 1921, but accepted orders and shipments were at a high level, the result of hand-to-mouth buying instead of buying ahead.

3. Unshipped orders divided by average shipments may be compared for different periods to show changes in the industry expressed in monthly shipments. Such a percentage applied to locomotive manufacturers in the early part of 1923 showed that unshipped orders on hand represented over eight months' work ahead, indicating that new business would probably have to wait that long before being delivered.



4. The individual manufacturer can compare his own average of the ratio of unshipped orders to shipments with the corresponding ratio for the industry and see how he is situated in relation to forward business as compared with the industry as a whole. He can thus measure in terms of days' or months' shipments the exact difference between himself and his competitors.

5. A comparison of unshipped orders with stocks on hand at the end of the same month will show whether there is an excess of demand or of supply to carry over into the next period. If there is an excess of unshipped orders over stocks, then the industry can generally operate without price cuts or increases in new business, but, with an excess of stocks, more business than the current unshipped orders will be necessary to enable the industry to take up the overstock. In many cases, of course, unshipped orders could not be filled from stocks, owing to differences in sizes, grades, specifications, or location. Similarly, an individual manufacturer may determine his own situation as to the ratio of unshipped orders to stocks in comparison with the entire industry. This may show the necessity of making concessions to put his business in better condition.

#### INQUIRIES

Although for most industries the receipt of new orders is the earliest indication of business trends, in certain lines a still quicker recording of the business pulse is available through statistics of the inquiries which manufacturers receive or the quotations which they make to inquirers. In such lines, especially those covering heavy equipment, inquiries are made by purchasers in advance of the placing of orders, sometimes by as much as a month. Such statistics have been used as follows:

1. By anticipating orders by about a month in many lines the trend of business can be ascertained through inquiries a month ahead of orders. If inquiries begin to slacken, the manufacturer can figuratively start to pull in his sails with this first sign of storm signals, while a sudden increase in inquiries can encourage him to carry more canvas, to continue the nautical analogy. If he waited until his figures on accepted orders came in, his preparations might be too late. The necessity for early danger signals is particularly great in the equipment field on account of the large amount of capital tied up in machines and the length of time necessary to change designs, etc., to meet new conditions.

2. The ratio of inquiries to orders accepted also has a definite interest. Inquiries will naturally be considerably more numerous than accepted orders; because the same buyer may send inquiries to half a dozen firms, but only one will get the order. In good times, where

buyers are not so careful about the prices of their purchases and where service may be the prime consideration, the number of inquiries per order is likely to be small; whereas in dull times not only will buyers shop around more before placing orders, but many propositions on which inquiries go out to the trade may be abandoned and no orders develop for any one.

3. The individual firm can compare its own ratio of inquiries per order with that for the entire industry to see whether it is getting its share of orders proportionate to the number of inquiries, indicating whether its prices, service, sales, follow-up, etc., are up to the standard of its competitors. The firm can also determine from such data whether its goods are well enough known to obtain the proper share of the total inquiries.

#### SALESMEN'S CALLS

Statistics along the same lines as inquiries are those covering number of salesmen's calls. A company that has kept records in this respect finds that when many calls are made by salesmen the indications point to more severe competition, lower prices, and increased productive activity.

#### PRICES

Price data are available on practically every line, since every trade usually has some place where its quotations are listed, whether it be an exchange, a trade association, or a trade paper. Prices need to be adjusted with the same care as production and stocks, since no longer is a high price considered the business man's chief objective. A high price may kill off much good business and result in lower profits than if a lower price had been fixed. The principal uses made of price data are noted below:

1. Prices are effects of conditions reflected in other statistics rather than causes; but price changes by one competitor will influence prices of others, and prices in one industry will influence prices of competing industries and of those using that industry's product. While higher prices are usually synonymous with profits, many industries have prospered by lowering prices, the automobile industry being an outstanding example. In such cases mass production, new processes, cheaper raw materials, etc., have come into play, enabling the manufacturers to lower their prices profitably.

2. Any firm can compare its own prices with the regular market to see if it is getting the general average for the industry. If competitors, or competing industries, are regularly underbidding a firm, the price differential should be the signal to examine costs, so that prices may be quoted at the same level as those of competitors.

3. If prices are given for various grades, changes in the differentials between the grades will indicate where demand is increasing most and where least.

4. Prices can be plotted against accepted orders, the relationship of the two curves being used to show whether in any particular industry the trend of orders correctly predicts the trend of prices and by how many months.

5. Prices can be compared with the general price curve of all commodities to see whether the industry is giving the public the benefit of reductions better than other industries, thus showing the extent to which greater efficiency in operation, management, or technical skill has been used for the benefit of the consumer. The electric light and automobile industries have used such charts in publicity work.

6. A comparison of prices of one's own industry with competing products will indicate the levels at which it is profitable to go after consumers and at which levels the competing lines will have such a price advantage that a campaign in that direction would be merely wasted effort.

#### IMPORTS

Import figures can be obtained on practically all commodities through the official figures of the Department of Commerce, which in each case represent the total quantities imported. Import figures are used by manufacturers as follows:

1. Imports show the competition in a particular line coming from abroad and which countries are gaining and which losing in their efforts to secure a foothold in the American market.

2. Imports compared with domestic shipments of the industry (the latter prorated to 100 per cent where necessary) will show the exact proportions of a product supplied from domestic sources and from abroad.

3. Imports of competing articles can be ascertained and their progress viewed in competition for American trade.

4. Imports of raw materials show the extent to which raw-material supplies will be plentiful and give an indication of price trends if the imported quantities are a large enough proportion of the total supply.

#### EXPORTS

Export figures as compiled by the Department of Commerce also show quantity data now in nearly all lines, with an increase in the details from time to time. Export trade has proved of great benefit in increasing business in many lines, especially when domestic trade was dull, so that a firm with an export trade to different countries

may be able to make up in sales to prosperous countries what it might lose temporarily in the domestic or other foreign markets through depressed business conditions. These figures present the following uses:

1. Export data show the amount of business done abroad in each line and, compared with the total shipments of the industry (the latter prorated to 100 per cent where necessary), the extent to which foreign business consumes the product. In commodities where the export trade is predominant, such as cotton or copper, the volume of exports gives a clue to the price situation by revealing the foreign demand.

2. Data by countries show where the principal export business is being done and may give suggestions for cultivation of the export field in other countries situated similarly in respect to uses of the particular product.

3. Comparison of one's own exports with the total for the industry will show whether the individual's foreign business is gaining or losing in proportion to the industry as a whole. Such comparisons can also be made by individual countries.

4. Data on exports of competing lines show the degree of progress each is making in the foreign field. Countries where competing lines are finding good markets might prove valuable fields of endeavor for the other lines.

5. Manufacturers of seasonal lines may find in export trade a means of balancing their production. For instance, items like tennis rackets, awnings, and bathing suits find a market in this country almost exclusively in the summer, but in the Southern Hemisphere, where the seasons are the reverse of ours, the demand for such articles is in our winter months, while in equatorial countries a year-round market may be found.

#### STATISTICS OF MATERIAL MARKETS

Besides knowing the situation in his own industry, the manufacturer needs to know conditions in the industries from which he obtains his materials. Materials may be not only agricultural, forest, or mineral products but partially manufactured goods, such as wood pulp or pig iron, which are used in further manufacture, or even completely manufactured products, such as batteries or tires for automobiles. Furthermore, the wholesaler purchasing from the manufacturer or the retailer from the wholesaler can use these same principles in the purchase of what is essentially his material, since, though it experiences no physical change between his purchase of it and the sale to the consumer, it undergoes the economic service of being brought to its actual sphere of usefulness. Where materials

come from abroad, foreign conditions must be watched also. Not only must specific data for the commodity be examined, such as production, stocks, etc., but the general financial and business conditions in the producing countries are of prime importance. In this connection allowance must be made for restrictive measures often imposed by various governments, such as those on sugar by Cuba, on coffee by Brazil, or on rubber until recently by the British Empire, which can not be shown up statistically.

The purchaser of raw materials, besides watching his own supply and consumption statistics, the uses of which were shown under "Statistics of one's own industry," finds it useful to look at the following information concerning the industry from which he buys:

1. Production and shipment figures of his materials will indicate the trend of supplies to be immediately available.

2. Production and shipment data on competing materials will tend to show changes in their relative positions, and thus determine which may be more affected by growing demand in the future.

3. Stocks of materials held by their producers will indicate the actual supplies on hand and the extent to which prices may be raised or lowered, according as the supplies are low or excessive.

4. Orders accepted will indicate any changes in demand for the materials and enable the purchaser to see in advance possible changes in supplies or prices.

5. Unshipped orders may be compared with stocks as a further indicator of the condition of the industry supplying materials, in the same manner as described under "Statistics of one's own industry."

6. Prices of materials can be compared with prices of finished products to see the spread between them. This comparison indicates when to purchase and at what prices to sell. Similarly, the spread between the prices of materials in foreign countries and those quoted in the United States, with allowance for freight, insurance, and other costs, will show the best markets in which to purchase and whether stocks should be bought here or abroad.

Furthermore, if the data on materials are segregated by localities or grades and sizes, the same principles may be further applied to these specific cases, along the lines indicated under "Statistics of one's own industry."

#### STATISTICS OF DISTRIBUTIVE MARKETS

Besides watching one's own industry and one's sources of supplies, the business man needs to make careful analysis of the classes of people or industries to which his goods are sold. Such market statistics are used by raw-material producers regarding the industries to which they sell, by manufacturers regarding the finished-

goods producers or wholesalers, by wholesalers regarding the retailers, and by retailers regarding the general public, the latter class applying the principle in a slightly different manner, which will be discussed under "General business statistics" in the following section. In general, manufacturers, raw-material producers, and wholesalers selling directly to another industry use the following information concerning the industries to which they sell:

1. Production and shipment statistics show the extent to which that industry is producing above or below consumption demands, and thus indicate the possible trend of future production and therefore of that industry's demand for materials. Consumption data are better than figures on production or shipments for this purpose, on account of the improvements made in manufacturing. For instance, the constant increase in electric power obtained per ton of coal has materially lessened the amount of coal which would normally be supplied for this purpose.

2. Large stocks of finished goods carried by a consuming industry will indicate a prospective small demand for materials in the immediate future and small stocks indicate an active demand. Industries where stock statistics are available both for manufacturers and for dealers are able to stabilize their inventories better, owing to the knowledge of stocks at all points. One side of the picture might not tell the true story. For rubber tires, for instance, data are available monthly as to manufacturers' stocks and semiannually as to dealers' stocks. Similarly, stocks of canned goods are being compiled both from canners and from grocers.

3. The production curve in a consuming industry often foretells the production in the industry supplying raw materials. The curve of clay fire-brick production, for instance, has been a good indicator of the output of pig iron, while building-construction figures have proved accurate indicators of the demand for furniture six months later. The National Association of Wood Turners found that the curve of operations of the textile mills precedes the demand for bobbins and spools, while pig-iron production has been found to forecast the wood turning for the hardware trade. Similarly, retail trade in a certain line can indicate to the wholesaler his prospective sales in that line, and wholesale trade may foretell to the manufacturer his productive output.

4. Just as orders in one's own industry give a quicker reflection of demand than does production, so orders in the consuming industry will give that reflection even sooner. The brick manufacturer, for instance, need not wait for the receipt of order statistics on his own industry to get a line on conditions, but he can look at the trend of building contracts with the knowledge that their ups and downs should shortly be reflected in his own business.

5. Those who sell to different businesses must watch them all, so that if a slump is foreseen in one industry in the near future the manufacturer can swing his production to the goods desired by the other industries and not be caught with unsalable material. Thus, the steel manufacturer watches the statistics of the railroads, the automobile producers, the building industry, etc., for the first indications of change in the demand for his output. Similarly, the wholesaler can watch the sales of various lines by retailers as indicators of the best sellers in the near future.

6. Large unshipped orders of a consuming industry will indicate a good demand from that industry for materials, unless it is shown to have large material stocks on hand.

7. Inquiries arranged by localities are useful to sellers in planning their work. The Asphalt Association, for instance, compiles monthly a tabulation of States, counties, and cities that are either contemplating, authorizing, or selling bond issues for paving work. This is distributed to their members, so that they may know the localities contemplating paving and where money is available for such work.

8. Wholesale trade compared with retail trade in the same line, such as shoes or dry goods, will indicate to what extent wholesalers are gaining, losing, or maintaining their ground in comparison with direct sales by manufacturers, which with the wholesalers' lines make up the goods bought by retailers.

#### GENERAL BUSINESS STATISTICS

Thus far we have dealt with the current statistics of particular industries—one's own industry, the industries supplying its raw materials, and the industries consuming its products. It has been shown in the preceding section that the retailer must watch for his consumers the entire business population rather than one or two industries, but the manufacturers, the raw-material producers, and business men in other lines should also go beyond their own related industries to look for future trends. When a depression comes along, as in 1921, almost all industries topple like a house of cards when a severe push is given to the industrial fabric. One's own industry may seem secure, just as a ship at sea on a calm day, but squalls or hurricanes will not find it unprepared if it has weather reports indicating their approach. The principal uses of general business statistics are like those relating to particular industries, for in most instances these statistics are merely composites of the figures of the various individual trades or industries combined into a total number with each item given its proper weighting according to its importance. Thus, the composite index number reflects the trend of general conditions as the individual industry's statistics reveal the status of that indus-

try. Some of the more important index numbers and other general business data are noted below, with their uses:

1. The Department of Commerce and the Federal Reserve Board issue composite index numbers on various phases of production, and certain private agencies have also compiled such indexes. The index number of production, whether of manufacturing or raw materials, shows the extent of productive activity as compared with previous periods, and any particular product or industry can be compared to this general index to see its comparative progress. This comparison will also show over a period of time whether a particular industry normally precedes or follows the curve of general production, thus establishing its position in the business cycle. Some industries, like silk, have been found to be leaders in showing the trend of general business, while others, like machine tools, have found that their curve, though being one of the first to experience the slump, is one of the last to respond to the rise. The establishment of such relationships in an industry enables the executive to forecast the possible effect of general trends on his own industry.

2. The index of stocks on hand, prepared by the Department of Commerce, shows the extent to which industry as a whole has stocks of goods on hand when allowance is made for seasonal conditions. Excessive stocks held generally, due regard being taken for the volume of production, would tend to indicate an overbalanced condition, as was the case in the middle of 1924, while small stocks would indicate that an increase might be expected in demand for goods as a whole. However, at the peak of a boom, as in the latter part of 1919, stocks may be low and not rise until heavy cancellations come in; in such cases orders, inquiries, and cancellations will bear the most watching.

3. The index of unshipped orders, prepared by the Department of Commerce, though not covering industry generally, owing to lack of data, has been an important indicator of the general trend of production. Since 1920 this index has generally foreshadowed the trend of the production curve, and these two curves, together with the stock curve, are used quite extensively by business men to watch the trend of general business. The unshipped-order index also shows the extent to which hand-to-mouth buying has prevailed during the past few years and, largely for this reason, has not proved as accurate an indicator of production since 1926. (See diagram 6.) A manufacturer's association in New England compiles an index of unfilled orders from over 200 members representing all the more important industries of its State.

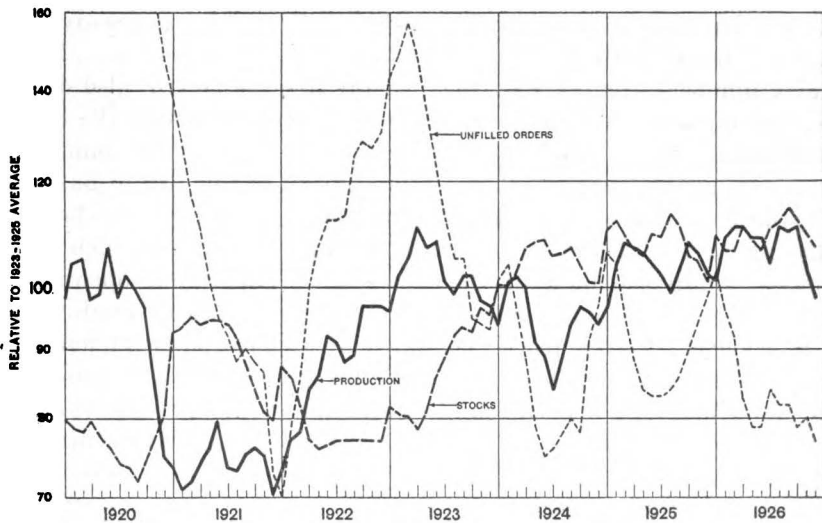
4. Indexes of employment, compiled from data collected by the Department of Labor and by many States, show the extent to which



employment is general throughout the country and therefore give an indication of general prosperity. Retail dealers watch such indicators closely, particularly for the industries most prevalent in their neighborhood, or for figures for their own State or city. The employment curve, compared with production over a period of years, shows the gradual expansion of output per wage earner for industry as a whole.

5. An unemployment index has recently been started by the American Federation of Labor showing the percentage of labor-union members unemployed. Such an index is a better indicator of general employment or unemployment than the index of employment in

DIAGRAM 6.—COMPOSITE INDEXES OF PRODUCTION, STOCKS AND UNFILLED ORDERS



factories, since many of the factory workers who have left industrial plants have transferred to building activities, service stations, retail trade, etc., for which no figures on employment are available.

6. The pay-roll index compiled by the Department of Labor and indexes of earnings compiled by various organizations indicate in a measure the general purchasing power of the Nation, industry, or community. They reflect this condition even better than employment, because they also take account of the scale of wages. When compared with the index of the cost of living, a comparison is obtained of the purchasing power of the wage earner which has proved of great value not only to the retailer but also to all employers', wage-earners', and public organizations to which wage questions are referred. The American Federation of Labor compiles indexes of labor's share in production and in consumption.

7. Price indexes have been compiled on wholesale and retail prices (the latter total also called the cost of living) by the Department of Labor and by private organizations, while an index covering prices received by producers of farm products is compiled by the Department of Agriculture. A comparison of these indexes sets forth the trend of relative purchasing power as between farmer, manufacturer or other business man, and consumer. These relationships are useful in watching for changes in the trends, as well as in preparing arguments for legislative or other action which would affect general price trends. The wholesale price index on the old pre-war base is also used extensively to deflate the postwar values to a pre-war base for comparison, as division of the postwar figures in dollars by the wholesale price index based on 1913 as 100 brings the data to 1913 values.

8. Indexes of wholesale and retail trade, the latter covering chain stores, department stores, and mail-order houses, have already been touched upon in their significance to distribution problems. These index numbers, compiled by the Federal Reserve Board, also denote general business prosperity and consumer buying, though the chain-store data must be carefully considered in the light of the number of stores operating, owing to the great expansion of this line of business. Furthermore, the mail-order houses reflect in large measure the purchasing power of the agricultural communities, from which these houses obtain the bulk of their business. The recent opening of urban retail stores by these houses may tend to modify this indication.

9. Indexes of stock prices, compiled by various financial journals, have in the past proved fairly reliable prognosticators of business, as the stock market has been found to anticipate business conditions by several months. Recently, however, with the better stabilization of business, the stock-price index has not foreshadowed business trends as well as in the past.

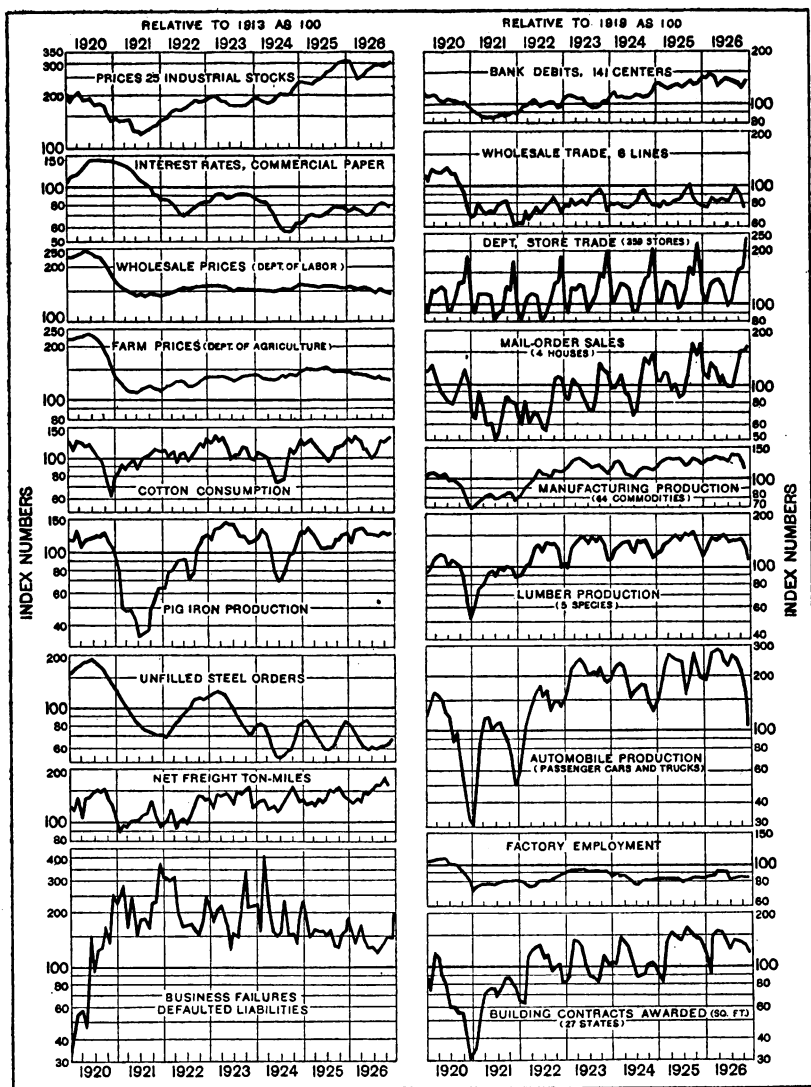
10. Indexes of bond prices can be compared with the stock-price indexes, particularly by those concerned with investments, to see the relative price advantage enjoyed at a given time by either class of securities. When the bond index is reduced to terms of a particular rate—say 4 per cent—then the yield of various classes of bonds can be compared with commercial paper and other rates to show their relative advantages in regard to yield as investments.

11. Life-insurance, savings-bank, and new-security statistics give an idea of the savings of the country and the extent to which new capital is being created. These items all have a bearing on the market for securities.

12. Advertising linage and postal receipts are used as indicators of sales campaigns, and thus of the thought of business men as to favorable sales conditions.

13. Check payments, as shown by bank clearings or debits to individual accounts, are the most inclusive measure of the volume of business, as they measure payments of all kinds. They are, however, subject to considerable seasonal fluctuations, particularly at the time

DIAGRAM 7.—PRINCIPAL BUSINESS INDICATORS



of the quarterly income-tax payments. Comparison of data for individual cities or districts with the grand total will indicate their relative progress and therefore their general sales possibilities.

14. Statistics of the number of freight cars loaded present a measure of the total physical volume of goods passing into consumption,

but as freight-car shipments are made after the goods are produced these figures are not barometers but rather thermometers of industrial activity and trade. These data are also early indicators of the relative prosperity of the railroads.

15. Statistics on banking conditions, such as the loans, discounts, reserves, etc., of the Federal reserve banks and of their member banks, indicate the tendency of industry to call upon the banks for loans and the extent to which further credits might safely be granted.

16. The rate of exchange on foreign currencies is carefully watched by those dealing with foreign countries, either importing or exporting. Actual prices in a foreign country may fall but may be neutralized by a rise in the exchange rate. Usually the general price level of a country will fall if the value of its currency rises, but in 1927 French prices did not fall correspondingly to the rise in exchange, and thus France became easier to sell to and harder to buy from. The rate of credit insurance is also of value to exporters as indicating the stability of business conditions abroad.

17. Interest rates and the Federal reserve ratio are important indicators of the cost of money and of the prospects influencing business expansion and the securities market.

18. Building contracts show the extent of building operations in the immediate future. As the building industry gives the impetus to a great variety of other industries, such as lumber, steel, cement, brick, furniture, enameled ware, draperies, linen, electric lights, plumbing, roofing, etc., its course is of particular importance to business in general.

19. Consumption statistics of electric power and of coal are used as indicators of general industrial activity, owing to the general use of power among all kinds of industries.

There are other general business indicators available in the Survey of Current Business and other collections of business data, but the above are those generally recognized as the most important indicators of business trends. With these as a basis, the executive can put his finger on the pulse of business and plan his own policies on the facts disclosed in surveying the field in this manner.

In conclusion it should be emphasized that the statistics must be secured and used promptly to be of the utmost benefit. Difficulties in the business situation should be foreseen as far ahead as possible in order to be guarded against or even prevented. With indicators at hand covering conditions for business in general, for consuming markets of one's product, for the industry itself, for other industries or products whose activity has been found to correlate therewith, for the raw materials needed, and for the individual firm's operation, the business executive is supplied with a chart of business to guide him intelligently in planning forward-looking policies.

## IV

### HOW TO COLLECT CURRENT STATISTICS

**SUMMARY.**—In inaugurating a statistical program, decision must be reached as to the items to be gathered, the period covered, the definitions of the terms, etc. Methods employed by trade associations in collecting and compiling the data are described, as well as methods of publicity and of presentation. The collection of data outside of trade-association members by the Bureau of the Census is described, and answers are presented to the usual objections to reporting statistical data.

Most compilations of current statistics outside of Government departments are prepared by trade associations or similar organizations. The preparation of statistics can therefore be best discussed from the viewpoint of the trade association. The following discussion has been taken, with slight changes, from the chapter on statistics of the bulletin, *Trade Association Activities*, recently published by the Department of Commerce.

#### WHAT TO GATHER

The organization of statistical work in a trade association is usually intrusted to a committee. This committee, with the assistance of the secretary, studies the statistics needed by the industry and the methods of obtaining them. It reports its findings to the entire association and leads the discussion on the subject among the members. Once a statistical program has been adopted, the work of carrying it out falls almost entirely upon the secretary or manager or a statistician in his office.

The value of trade association statistics depends in a large measure upon the manner in which they are collected and presented. Statistics gathered and prepared without care or without attention to the best statistical practice may often be misleading rather than helpful. A trade-association secretary should therefore familiarize himself with the accepted principles of current statistics, it often being advisable to secure expert assistance on this matter. Misleading statistics are worse than no statistics at all. Well-organized statistics, like a smooth-running machine, give ample returns in earning power through uses which executives make of them.

Of prime importance to the future utility of association statistics is the decision as to what to gather. The results can show no more than the items to be asked for on the blank. The importance of each

item to the industry, therefore, should be carefully weighed. Those items should be included which there is reason to believe will prove useful to the industry and which may be readily obtainable, but this list should not be expanded too far, owing to the possible lack of available records by smaller concerns and to the danger of making the blanks too cumbersome. Other items or details can be added later as demand develops.

Before deciding definitely upon the items to be covered, investigation should be made of the current statistics already available on the subject, which inquiry of the Department of Commerce will probably disclose. This procedure will, in the first place, prevent possible duplication of data already being gathered. Secondly, it will enable any trade association to make its blanks conform in classification to statistics of imports and exports on the commodity in question, to the production figures shown in the census of manufactures, and to any other related current figures. If the items are made comparable with these other figures, association members can readily find out the exact relation which their figures bear to the census production figures, can calculate the percentage of their product exported each month and compare their progress, item by item, with competing or consuming industries.

The particular items to be gathered will vary as between different industries according to the special requirements of each industry, but, in general, the five figures considered essential are production, shipments, finished stock, orders accepted, and unshipped orders, or such modifications as may be necessary to meet the particular requirements of the industry or trade under consideration.

Among the associations covering all these five items in their reports are the National Association of Sheet and Tin Plate Manufacturers, the Oak Flooring Manufacturers' Association, the Maple Flooring Manufacturers' Association, the Tight Barrel Circled Heading Manufacturers' Association, the Illuminating Glassware Guild, the Glass Container Association, the Paving Brick Manufacturers' Association, the Paperboard Industries Association, and the National Association of Finishers of Cotton Fabrics. All these associations, except the three covering wood products, also show their figures as percentages of capacity. In some lines stocks are not generally carried, and such statistics are thus of no importance, while in others production and shipments or production and orders may occur at approximately the same time and may thus be combined. In certain lines machinery activity is used as an indicator of production, as in the reports on silk machinery by the Silk Association of America, and on printing activity by the United Typothetae of America. The Locomotive Crane Manufacturers' Association and the Electric Overhead Crane Institute secure data on inquiries, which in the equip-

ment field anticipate orders by a considerable period and thus show the first indications of changes in business sentiment.

Many associations need further details on their statistics, such as the expression of certain data in dollars as well as in quantities, the segregation into types, sizes, grades, etc., and segregation of orders and shipments by geographical districts. The tire figures compiled by the Rubber Association of America are classified by kind (cord or fabric), by size (regular, heavy, or balloon), by shape (clincher or straight-side), and by the many different tire measurements.

The figures on hardwood lumber, compiled by the Hardwood Manufacturers' Institute, are classified by species (red gum, sap gum, oak, etc.); by grade (No. 1 common, etc.); by district (southern or eastern); and by the various dimensions. The Tubular Plumbing Goods Association and the Association of Cotton Textile Merchants of New York also present reports in great detail.

Many associations have found that State or district totals are particularly advantageous in studying local conditions which may be entirely different from the national situation. As examples of geographical segregation may be cited the Paving Brick Manufacturers' Association, which presents its shipments by State of destination; the Common Brick Manufacturers' Association, classifying its figures by State of production; the Life Insurance Sales Research Bureau, presenting its new insurance business by States; the National Association of Real Estate Boards, classifying its data by cities; and the American Railway Association, with data divided into railway-operating districts.

Reports in dollars are not generally so valuable as those in quantities, owing to price fluctuations, but in some lines, where the sizes of the items differ materially, such as the machinery statistics collected by the Foundry Equipment Manufacturers' Association, the pump statistics collected by the Hydraulic Society, and the office furniture statistics collected by the National Association of Steel Furniture Manufacturers, dollar amounts have up to the present time provided the only means of totaling their data. A rather novel classification is that presented by the National Machine Tool Builders' Association, where the firms are grouped according to size, and relative numbers are presented on that basis.

The details asked for on the blanks should not be so minute that their segregation would reveal the operations of individual concerns. For instance, if it were known that only two members were making a certain grade of goods, the segregation of that grade from the others would permit each firm to know what the other was doing. Such details should be eliminated from the forms.

### PERIOD COVERED

When the items to be collected are decided upon, the period of time covered by each report must be determined, whether daily, weekly, semimonthly, monthly, quarterly, etc. As a rule, monthly reports have proved the most popular. They are less susceptible than weekly returns to temporary influences, and thus can be compared with greater confidence. On the other hand, some industries want figures more often, and in certain cases daily reports are made on some items, such as orders, shipments, and prices. The issuance of more frequent reports, however, puts a heavier burden on the members as well as on the clerical staff of the association.

### PREPARING THE FORM

With the above questions decided, the schedule or form for obtaining the reports can be set up. It should be simple and clear. Experience has shown that even in the reports given most careful consideration, questions are misunderstood, and as a result the figures sent in are not those desired. There should be a meeting of minds on the exact definition of the terms, and to that end all items should be clearly defined, or explained in a footnote if necessary. Some associations, for instance, require reports only on stock goods, like the National Association of Steel Furniture Manufacturers, or on standard grades, like the Paving Brick Manufacturers' Association, and omit special ware entirely from the compilations, but if this definition is not clearly stated on the blanks, many firms may include the special goods. Even the definition of the commodity itself is often necessary, as the exact dividing line between many articles—such as box board and paper board, locomotive cranes and power shovels, structural steel fabrication and steel-plate work—is often difficult to draw without a definite statement. Definitions in some detail of the exact data to be reported are printed on the forms distributed to members by the News Print Service Bureau, the Bureau of Envelope Manufacturers of America, the Cordage Institute, and the American Face Brick Association.

The items of production, stocks, etc., also need definition, for those not accustomed to reporting these kinds of statistics. Some firms, for instance, will report as accepted orders their gross orders, while others will deduct cancellations; some consider that their orders are filled once they are produced, while others wait until they are shipped before deducting them from the unfilled-order total.

To remedy this situation, a committee on statistics was appointed in October, 1925, by the American Trade Association Executives, the national organization of trade association secretaries and managers, and its preliminary report to the association recommended that



standard definitions be adopted. A subcommittee on terminology of the sectional committee on standards for graphic presentation, sponsored by the American Society of Mechanical Engineers, has studied this subject in further detail, and has recently submitted the following definitions for adoption:

**Projects.**—Projects consist of plans toward the accomplishment of which sufficiently definite steps were taken during the period to justify the presumption of subsequent orders for commodities. Projects should be reported by the planner or his authorized agent.

**Inquiries.**—Inquiries consist of formal requests received during the period for quotations or other information looking toward the ordering of goods. Inquiries should be reported only by the recipient of the inquiry and requests made by curiosity-seekers, students, or others not apt to lead to orders should be excluded. Where duplicate inquiries to different firms are deducted from the totals by the compiling organization through identification of the source of each inquiry, the resulting compilation may be called "net inquiries" and the duplicated totals "gross inquiries."

**Orders accepted.**—Orders accepted consist of orders, reservations, bookings, contracts and commitments accepted during the period from or for customers or related establishments or departments functioning as customers and definite as to quantity and commitment, whether delivery date is specified or not. Where an order calls for a specified amount, more or less, the amount specified should be considered as the order. When the goods are shipped, any excess over the amount specified should be added to orders accepted for the period and any deductions should be taken as cancellations.

**Cancellations.**—Cancellations consist of orders canceled during the period or reduced or written off in any manner except by shipments.

**Net orders accepted.**—Net orders consist of orders accepted during the period minus cancellations during the period.

**Shipments.**—Shipments consist of finished product disposed of during the period by any form of delivery to the next stage of distribution for customers or related establishments or departments functioning as customers. Consigned goods are not to be considered shipments until disposed of. In retail stores the term "sales" may be used for shipments.

**Returned product.**—Returned product consists of product previously recorded as shipments but returned during the period for the credit of customers or related establishments or departments functioning as customers.

**Net shipments.**—Net shipments consist of shipments during the period minus product returned during the period.

**Resales.**—Resales consist of product originally purchased for resale from establishments within the same industry and disposed of during the period. Resales should not be included with shipments of the reseller's own product, as they already are included in the shipments of the original producer.

**Unshipped orders.**—Unshipped orders consist of unshipped balances of orders on hand at the end of the period. Unshipped orders may be divided as between applied and unapplied, according as to whether stocks have been allocated to them or not.

**Finished stock.**—Finished stock consists of product on hand at the end of the period ready for delivery to the next stage in distribution and includes consigned goods until disposed of. Finished stock may be divided as between applied and unapplied, according as to whether it has been allocated against particular orders or not.

**Production.**—Production consists of product actually finished during the period ready for delivery.

**Purchases.**—Purchases consist of orders, reservations, contracts, and commitments given during the period to sellers or related establishments or departments functioning as sellers and definite as to quantity and commitment, whether delivery date is specified or not. Where a purchase calls for a specified amount, more or less, the amount specified should be considered as the purchase. When the goods or materials are received, any excess over the amount specified should be added to purchases for the period, and any deductions should be taken as canceled purchases.

**Canceled purchases.**—Canceled purchases consist of purchases canceled during the period or reduced or written off in any manner except by receipts.

**Net purchases.**—Net purchases consist of purchases during the period minus canceled purchases during the period.

**Resale purchases.**—Resale purchases consist of product purchased during the period from establishments within the same industry for resale. Resale purchases should not be included with purchases.

**Unshipped purchases.**—Unshipped purchases consist of unshipped balances of purchases outstanding at the end of the period.

**Receipts.**—Receipts consist of materials or goods acquired during the period by any form of delivery from or for sellers or related establishments or departments functioning as sellers. Consigned goods are not to be considered receipts unless purchased.

**Returned receipts.**—Returned receipts consist of materials or goods previously recorded as receipts but returned for credit during the period to sellers or related establishments or departments functioning as sellers.

**Net receipts.**—Net receipts consist of receipts during the period minus returned receipts during the period.

**Material stock.**—Material stock consists of materials on hand at the end of the period upon which no work has been done by the reporting industry, although it may be finished product of a previous stage in distribution.

**Process stock.**—Process stock consists of materials on hand, upon which work has been started but not completed at the end of the period.

**Factory consumption.**—Consumption consists of materials entering into the process of manufacture during the period, whether the process is completed during the period or not.

In line with making the reports as clear as possible, the facts to be gathered on the form should be reported as units rather than as percentages or relatives, owing to the difficulties of combining the latter data. For instance, we may take the simple illustration of a supposed industry with two plants. One, a 10,000-ton plant, produced in a given month 5,000 tons, which is 50 per cent of its capacity. The other, a 1,000-ton plant, produced 1,000 tons, which is 100 per cent of its capacity. If an association secretary secured merely the percentages of capacity he would have just these two figures, 50 per cent and 100 per cent, which averaged would give him 75 per cent as representing the per cent of the industry's capacity which was active. This 75 per cent figure, of course, would be an error. The total capacity of the industry is 11,000 tons. Its total production is 6,000 tons. The actual per cent of the industry's capacity which is active is not 75 per cent, but 54.5 per cent.

The mere reporting of percentages of capacity or of increase or decrease from the preceding month fails to establish the proper relationship between large and small firms, unless figured out on a basis of total capacity as indicated above. How much easier it is simply to report the items in units, such as tons, in the first place, so that only one addition need be made! Some executives, it is true, will give only percentages. They seem to be afraid to give their unit or absolute figures, even to the secretary of their association. The misleading tendency of percentages when combined as a simple average has been revealed in the example cited. If, to avoid such errors, the capacities of plants as well as the percentages of capacities active are given, then the association's secretary obtains the unit figures anyhow in order to get his finished product. Giving the unit figures in the first place saves time, energy, and clerical work.

A detail of the form that should not be overlooked is the name of the association and the exact address of the person to whom the report should be returned for compilation. Often such reports are mis sent to Government departments or to other organizations and may be lost or greatly delayed in getting to the proper person.

On the first report it might be advisable to secure figures on capacity so that definite percentages of production, etc., can be calculated in the future. As mentioned above, such figures on the relationship to capacity are important items in the reports of many associations. The capacity figures should be revised about once a year to take account of changes in the industry.

The capacity item should be carefully defined, owing to the tendency of companies to use inflated figures designed to make an impression in sales talk. Where capacity can be ascertained by machine measurements, as in the box-board industry, an accurate indicator can be obtained, but otherwise the capacity of a plant is apt to vary with the individual making out the report, unless it is tied down to a strict definition. On the other hand, capacity for making a particular product is elastic at best, especially in plants able to produce other articles. For instance, a fabricator of structural steel may turn his plant to the fabrication of plate work, shipbuilding, the construction of railroad cars, etc., and thus keep his force busy, although working at far below capacity on structural business alone, while even on strictly structural work the tonnage will vary considerably as between light work and heavy work.

To overcome as far as possible such difficulties, the Bureau of the Census has used in its inquiry relating to structural steel the following definition, which may be modified to suit other industries:

Capacity of the plant is to be regarded as the tonnage of structural steel-work that actually could be turned out running single turn on the character

and class of structural work that the plant ordinarily secures. Structural work is considered as all work using structural shapes.

The carelessness with which some concerns fill in the report form has led some associations to put the schedule into the form of a balance sheet, so that all the items shall check. The Paving Brick Manufacturers' Association, the Bureau of Envelope Manufacturers of America, and the Illuminating Glassware Guild secure an exact balance on all the items on their reports. A form of balanced reports is given below in some detail, covering all the principal factors of products and material, showing the balance maintained between the quantities appearing opposite the various items. This form goes even further than most association reports, which generally cover only the sales and production situations:

#### SALES SITUATION

Unshipped orders, end previous month.....	10,000
Orders accepted.....	5,000
Cancellations.....	1,000
	4,000
Net orders accepted.....	4,000
Total demand in orders.....	14,000
Shipments.....	8,000
Returned product.....	1,000
	7,000
Net shipments.....	7,000
Unshipped orders, end of month.....	7,000

#### PRODUCTION SITUATION

Finished stock, end previous month.....	3,000
Production.....	8,000
	11,000
Total supply of finished goods.....	11,000
Net shipments.....	7,000
Stock adjustments.....	1,000
	8,000
Finished stocks, end of month.....	3,000

#### PURCHASE SITUATION (MATERIALS)

Unshipped purchases, end previous month.....	5,000
Purchases.....	3,000
Canceled purchases.....	1,000
	2,000
Net purchases.....	2,000
Total commitments.....	7,000
Receipts.....	4,000
Returned receipts.....	1,000
	3,000
Net receipts.....	3,000
Unshipped purchases, end of month.....	4,000

## CONSUMPTION SITUATION (MATERIALS)

Material stock, end previous month.....	4,000
Receipts.....	4,000
Returned receipts.....	1,000
	<hr/>
Net receipts.....	3,000
	<hr/>
Total supply raw materials.....	7,000
	<hr/>
Consumption.....	5,000
Stock adjustments.....	1,000
	<hr/>
	6,000
	<hr/>
Material stock, end of month.....	1,000

An important part in the success of trade association statistics is the confidence reposed in the secretary for the complete secrecy of individual returns. This secrecy must be inviolable and usually only the association secretary or a trusted clerk is permitted to see the individual returns.

In some association offices the returns are placed upon an adding machine, and as soon as the totals are obtained the original reports and all records relating thereto are destroyed. While this is an ideal method of assuring permanent secrecy of the individual reports, a difficulty is presented where identical firms do not report each month, in that it is almost impossible to secure an accurate total at some future time for comparison with a more complete current report for the industry. This can be remedied in many cases by having a list made of the reporting firms so that the gaps may be filled in later from the nonreporting firms. However, where concerns discontinue their membership, though still in business and no longer included in the reports, the past association totals can not be made comparable with the subsequent reports without deducting the missing firms' figures from the totals. If no record of the individual reports is kept by the association, this will be impossible without resorting to duplicate figures from the individual firms, which may entail considerable annoyance. A coded record of past figures, the secretary alone being in possession of the code, overcomes this difficulty.

Some associations, instead of having an individual firm sign the reports, put a key number on each form so that no one will know the identity of the firm reporting any set of figures. In such cases the secretary alone knows the firms to whom the key numbers are assigned. In certain associations the assignments of the key numbers are even kept secret from the secretary, being known only by some outside organization, such as the trust officer of a bank, to whom the reports may be sent, and then transmitted in bulk to the association office for tabulation.

## COLLECTING THE DATA

Although some associations give their members a supply of forms to last for some time, most organizations send out the forms regularly to reach the members on the last day of the period to be reported. This latter method has the advantage of acting as a reminder that the report is due. Daily reports, of course, can be supplied more easily in advance, and in the case of weekly reports that procedure might also be applied with economy in mailings; for it is easier to remember the day of the week on which reports are to be made than the day of the month, especially as the latter may vary from month to month, with delays in the compilation of a firm's figures. Weekly reports, however, must be sent promptly on the day appointed, as their issuance on time is more vital, covering, as they do, such a short period.

To secure prompt attention, the forms should be addressed directly to the person in charge of the statistics for each company. It should be understood by each reporting official that the reports must be taken care of promptly and that in his absence they must be filled out by some one else, and not merely left on his desk for two or three weeks in times of vacation, sickness, etc.

The sooner the forms can be returned to the association office the quicker the tabulation can be made for the benefit of the industry. On monthly reports members are usually asked to send in their data within 10 days, although in many cases 20 to 25 days may elapse before all reports are in. The reports of the American Iron and Steel Institute and of the American Zinc Institute are examples of compilations distributed within 10 days after the close of the month. The value of news as perishable as monthly business statistics is greatly increased by gaining a few days in publication, and every effort should be made by the secretary to show each member the importance of reporting promptly. Telegrams are generally sent to those firms whose reports are not in at the specified time, and personal calls on habitual delinquents have proved effective in securing more prompt attention to the reports. The secretary of a lumber association points out in a symposium conducted by the Chamber of Commerce of the United States that in the constant effort to get returns in early some associations have made rebates in the members' dues, based on the number of reports turned in, while others do not send the reports to members who do not contribute data. This latter method, it is stated, is not very effective, as those who desire the results will usually contribute their figures.

## COMPILATION

If it is possible to obtain all reports early in the month, the tabulation should include all members each month, or at least the iden-

tical reporting firms, so that the figures from month to month may be strictly comparable. If identical firms are not available, the figures in units will not be strictly comparable but may be made approximately so through showing the percentage relation which each item bears to the capacity of the firms reporting for each particular month. Where no capacity figures are available to make comparisons of this kind, the report should distinctly state that a certain number of firms are missing. If the reports for the missing firms come in at some later date, the early reports can be revised to show a true comparison of identical firms. Where the missing firms are very small and habitually late, it is better to have the tabulation made without them, for the revision in the subsequent month by the addition of their figures would not change the conclusions to be drawn from the data, and the advantage of speed will more than compensate for the slight inaccuracies. The American Electric Railway Association compiles its reports in this manner, showing the percentages based on the identical reporting firms, later revising the data to include additional reports. In the face-brick industry the number of reporting firms varies so greatly that the American Face Brick Association finds that an average per firm is the best comparison between various periods, and the Piano Bench and Stool Manufacturers Association also compiles its reports on this basis.

If nonidentical figures are compared in percentages of capacity, care should be taken that the data are representative. Should it happen that several large firms were missing one month, even a comparison on a percentage basis might not be correct, because the missing firms might have a different trend. The more detailed the statistics are, the more important it is to have reports from identical firms. For instance, firms not reporting might comprise 2 per cent of the total association output and their absence would be negligible in this respect; but these firms might make 10 or 15 per cent of a particular grade of the product for which separate figures were collected, and their absence would have a considerable effect on the totals for that grade. The same considerations apply to geographical segregations as well as divisions into grades and the like.

As a matter of fact, to be of any real use to any industry, the association's statistics should include 50 per cent or more of the industry's normal output, and 70 per cent is advisable to insure a representative character. Less than these percentages might not show the true trends, and in such cases it might be advisable not to compile the figures until enough additional reporting firms are secured to obtain a comprehensive report.

When there are changes in the membership of an association, particular care is needed to keep the reports comparable. The association reports might at all times include 100 per cent of the associa-

tion membership, but if that membership were often increased or decreased the reports would not be comparable. New firms added to the roster should be asked to send in their respective reports for previous periods, to be added to the previous totals, in order to have comparable reports. The American Dry Milk Institute has increased the representative character of its identical reporting firms by this method. It is not advisable to add firms singly, owing to the possibility of disclosing their operations. In this case the one firm's reports had better await the admission of a second member before being added to the old reports. When a member withdraws from the association, arrangements may be made to have the firm continue its reports so as to insure comparability of the totals. If this is not possible, the firm's figures can be subtracted from the totals, provided another firm is either added or withdrawn at the same time, so that individual figures are not revealed.

On the other hand, where a firm goes out of business or retires from that particular line, its past data need not be deducted from the association reports, for the totals will still be comparable, since the liquidating firm's report thereafter will be zero. Any business which would have gone to that firm in the past will be distributed to the other firms in the industry, and thus still will be shown in the totals. Similarly, a firm just beginning business can be added to the totals without destroying comparability with the past, for its business will come from what otherwise would go to the remaining firms in the industry.

When an association has had a rather rapid growth over a period of years, and it is impossible to secure figures from the new firms over the earlier period, the reports can still be made fairly comparable by finding the percentage which the production of the firms reporting in any particular year bears to the production of the year in which all the firms reported and by prorating the figures of the other years to the level of this latter year by these percentages. In this manner the data for the Hydraulic Society were recently put on a comparable basis from 1919 through 1926, in spite of a considerable increase in the number of reporting members, and a similar method was employed to obtain comparable data for the National Association of Paper Box Manufacturers from 1923 through 1926.

In an industry where capacity figures are collected, the above results can be secured more accurately and with less effort by merely prorating the figures on the basis of the relative capacity of the two periods. Many associations, especially in the lumber field, apply this method month by month by prorating the figures of the varying number of firms reporting each month up to a certain standard on the basis of the relative capacity of the reporting firms to the capacity of



all the firms included in the standard. The accuracy of this method is shown by comparing the close relationship between the total lumber production compiled monthly on this basis from association reports by the Bureau of the Census for the Survey of Current Business and the annual census returns. By the former method the production of lumber, although many species were unreported, showed an increase of 6.7 per cent from 1924 to 1925, while by the final census figures, including all species, it increased 8.3 per cent.

The advisability of not showing separately such details as would reveal the activity of individual firms, owing to inadequate representation in that item or because one of two firms were the only makers of a particular style or grade, has already been mentioned. In such a case the particular grades could be combined with other similar grades or put into a miscellaneous classification or omitted altogether.

Individual operations are also liable to be revealed if each firm's data are shown separately on the tabulation sheet that goes to the members even if given merely a code number. Such segregation of individual figures may be identified by competitors, owing to the knowledge of when certain large orders were placed, and thus reveal individual operations. This revelation of the business of competitors hardly comes within the sphere of free competition.

#### PRICE STATISTICS

The compilation of price statistics should be watched with particular care. Such statistics can be collected, tabulated, and distributed without taking on the significance of unlawful intent or without producing an unlawful result. Careful distinction must be drawn between this operation and the Eddy "open-price" association, in which prices to be quoted are circulated among the members. Nothing in this discussion has any relation to the "open-price" plan. As the Secretary of Commerce stated in addressing the Trade Association Conference in Washington on April 12, 1922: "The officers of the Government do not believe that these functions (open-price reporting) are in the public interest, whether they are used in violation of the law or not."

Knowledge of prices at which sales have been consummated is one thing; exchange of prices proposed to be quoted is quite a different matter. One is the record of a fact which affords an essential element in the equipment of an individual to deal competitively with intelligence. The other is a submission of plans which almost certainly results in unanimity of action or agreement, in effect if not in form. Agreement as to future price is prohibited, and so is agreement not to differ in price.

The collection of sales-price statistics is not legally determined by the period covered by such reports; therefore a monthly or daily service stands on the same plane so far as time only is concerned.

The collection of sales prices tends readily to the manipulation of market prices through the device of restricting reports to the "best" sales. It became apparent to several associations early in the development of statistical service that a rising market was materially assisted if the sales reports carried only such transactions as were at the crest or above it, while reports including sales below the peak tended to retard the upward movement. Likewise, reporting only "best" sales tended to check the movement of the downward market. Such a method of reporting sales is manipulation of the market, a suppression of truth for the purpose of creating a false impression, an unlawful method of accomplishing an unlawful object. The association which collects, compiles, and distributes sales prices must insist, as the price of carrying on this service, that members report all sales or none, and that the transactions reported are those which have been closed in good faith. Selection of reports to create a favorable impression on the uninformed convicts the procedure of a guilty purpose.

In compiling price statistics a simple average of all reported prices is open to the same objection as a simple average of percentages of capacity previously explained. It makes no distinction between the price on 10,000 tons shipped by a large mill and that on 1,000 tons shipped by a small mill. A better way to secure a good average price is to weigh each price by the amount shipped at that price, dividing the sum of the totals thus secured by the total shipments to get a weighted price for the industry.

The average price, although it is a weighted composite for the entire industry, may not be the price received by any one concern. Thus, particularly when individual prices are apt to vary, a range of prices is more useful than an average price. With such a range tabulated—that is, the amount shipped at 10 to 11 cents, that from 12 to 13 cents, etc.—each firm can see the exact working of the price level. There has also been a tendency to misuse average prices in cost accounting. The primary purpose in compiling average-cost data is to encourage a study of individual costs, but too often there is a reverse effect, the manufacturer using average costs for the industry to arrive at a sales figure for his products instead of accurately computing his actual costs.

#### PUBLICITY

Distribution of the compilation should be made promptly, not only to the members of the association but to all persons interested, including trade papers and Government agencies, so that adequate pub-

licity may be obtained. The association will thus put its statistical activities in the open, instead of being under suspicion of secret exchange of information. The relation between publicity of statistical service and evident good faith in the event that an unlawful agreement is sought to be inferred is a factor not to be hastily dismissed.

Most associations place on their mailing lists for these reports such outsiders as request their figures. As the members of the association bear the expense of compiling the data, it has generally been recognized, in discussions of distribution of statistical information, that trade associations may be reimbursed for the expense entailed in the distribution outside of their membership. If any charge is made for distribution, it would seem to be the better policy to keep the charge as close as possible to the reimbursement of actual cost. Any penalty upon nonmember circulation tends to counteract the purpose for which the service is conducted.

The first idea of the association member may very well be that the value of the information should be enjoyed only by those who belong to the association; but a second thought will show that this view is so shortsighted that it helps defeat the purpose of the statistical service. The idea of this service is that the information will enable the man who uses it to act intelligently. That is to say, he is protected against acting in ignorance of market conditions. Manifestly, it is not enough that one man or a part of those whose actions create a market can act intelligently. Their market is liable to a constant disturbance through decisions made in ignorance of market conditions. It is quite as necessary to the stability of a market that nonmembers of the association trading in it be informed as to its governing conditions as that members should know them. And since it is the stability of the market which is the prime interest of all concerned it would seem to be the proper spirit of statistical service to secure as wide a circulation and use throughout the trade as possible.

This broader conception of the purpose of statistical service also includes the buyer. The relation between any seller and any buyer is a reflection of market conditions and fluctuates with those conditions. What the buyer thinks those conditions are governs his actions. If he knows what they really are, he buys in confidence, steadily and continuously, tending to avoid both long and short dealings.

More general planning of purchases according to statistics will provide a more evenly balanced sales and production schedule and will minimize both the big booms and the troughs of depression, so that a manufacturer may run his plant more evenly without having to increase his capacity for a temporary peak load and then keep it

idle. Balanced purchasing through statistical information thus tends to eliminate both the big profits and the big losses on both sides, it tends to stability of production and limitation of capacity to actual needs, it tends to lessen the expenses of both buyer and seller and thus reduce costs to the ultimate consumer, and it tends to show the high-cost producer the true situation in time to retire intact before having to dump distress goods on the market. The fact that almost all industries of any consequence now publish their totals should dispel the fear that the figures are more advantageous to the buyer. Furthermore, if conditions are bad in any industry, the news frequently leaks out and is usually exaggerated through unfounded rumors. If the actual facts were available, these rumors would be held within bounds and the industry would be benefited rather than hurt. Refusal to publish figures is taken by buyers to mean a bad condition, and the sellers are damaged much worse than by the actual facts.

#### MODE OF PRESENTATION

Many associations send their compilations to their members without any comment at all, while others go into explanations not only of their particular figures but of market conditions, and some, like the National Lumber Manufacturers' Association, present a compendium of available current statistics relating to their industries from all possible sources. Owing to the frequent occurrence of special circumstances, such as seasonal changes, labor troubles, and other extraneous causes, which might not be grasped at first glance by executives unfamiliar with statistical practice, some explanation of these causes may often be a great help to the members in properly weighing the importance of the information. On the other hand, interpretation should not indicate a desirable trend of action, much less urge the adoption of any common course, as explained in Chapter IV of Trade Association Activities.

To be of the most value, the presentation should include, if possible, the preceding months of the year and the corresponding months of the previous year, with cumulative totals for each period. Where the reports are of too detailed a nature to permit such comparisons, at least the previous month and the corresponding month of the previous year can be given. It is often a help to the executive to have calculated the percentage changes from both these periods, as well as on the cumulative totals. Many associations calculate for each firm its percentage of the association totals and of the association capacity and insert these percentages on that member's report, so that each executive may see his own firm's progress relative to the industry as a whole. The National Association of Steel Furniture Manufacturers, the Label Manufacturers' National Association, and

the Bureau of Envelope Manufacturers of America are among those calculating their members' percentages in this manner.

Often the trends of the industry can best be compared by means of relative numbers, by letting the monthly average of some year or period of years equal 100 and dividing that average into each monthly figure. Especially when different products are reported on the association's forms, the relative trend of each can be compared over a long period of time when expressed as relative to a base period of fairly normal activity. These relative numbers may also be adjusted to allow for regular seasonal variations or long-time growth of the industry by means of technical methods, for which it is advisable to secure services of a trained statistician. The National Machine Tool Builders' Association, the United Typothetæ of America, the Rope Paper Sack Manufacturers' Association, the National Association of Wood Turners, and the Motor and Accessory Manufacturers' Association, all present their reports as relative to some particular period.

In many industries it is advisable to reduce production and shipment figures to daily averages so that each month's operations may be compared on the same basis. The occurrence of a holiday or an additional Sunday in a month will make a difference of about 4 per cent in the month's working time, and by reducing the figures to daily averages by the number of actual working days in the month a correct comparative set of figures can be secured. This method has proved extremely valuable in the combined production index of the Department of Commerce, and when charted on this basis the index has a very smooth curve, without the many small ups and downs that often occur without this adjustment and which make it difficult to see the real trend. The steel-ingot reports of the American Iron and Steel Institute, reduced to a daily average, exhibit the same principles.

#### GRAPHIC CHARTS

A further aid to the correct presentation of the figures is the graphic chart. The chart tells the whole story at a glance and to many busy executives will show the situation in a minute, while the figures themselves can be passed on to experts for analysis. The charts should be as simple as possible. It is not necessary to chart all the detail on the report but merely the outstanding factors. The fewer details given on the chart the more room there will be for each firm to plot its own figures against the grand totals of the industry. It may be more convenient for this purpose to have relative numbers rather than the absolute figures plotted on the chart, so that any firm's figures may be reduced to the same relative basis as the industry as a whole.

Many persons who can not make out the meaning of statistical tables can understand charts; yet any but the most simple charts are apt to be misunderstood by many readers. Especial care should be taken that scales and relationships are properly made, and here again expert advice is desirable to make sure that the presentation will not be misleading. Simple bar charts to compare volumes or line charts to show trends are generally the best for ordinary use. The lines should stand out clearly and the rulings should be only frequent enough to aid the eye in reading the plotted points. Too many rulings will make the actual curves harder to follow than where the curves are set off against a larger field of white background.

Line charts are used regularly by the News Print Service Bureau, the American Face Brick Association, the American Washing Machine Manufacturers' Association, the National Alliance of Furniture Manufacturers, and the Hydraulic Society. A form of bar chart called a barometer, showing the relation of the various items to the corresponding month of the previous year, is used by the Maple Flooring Manufacturers' Association, while the National Association of Lumber Manufacturers uses a similar barometer but relates all the items to current production. A combination of line and bar charts is used by the National Machine Tool Builders' Association, while the Life Insurance Sales Research Bureau adds a map to its line and bar charts to portray the geographical trends.

The preliminary report of the committee on statistics of the American Trade Association Executives contains the following recommendations for standard charts:

*Standard sizes of charts.*—The committee recommends a discussion of the possibility of standardizing over-all chart sizes. The committee recommends that the minimum size of charts should be the letter-sheet size— $8\frac{1}{2}$  by 11 inches. As to larger charts, two standard methods may be followed. One is that larger charts be multiples of the  $8\frac{1}{2}$  by 11 inch size, so that the over-all sizes of the series would be  $8\frac{1}{2}$  by 11, 11 by 17, 17 by 22, etc. Thus the larger sizes would all fold down to the letter-sheet size by progressive folding in half.

Another method, applicable particularly to charts of long-time series, is that allowance be made for a binding margin in the larger sizes, so that while retaining  $8\frac{1}{2}$  by 11 inches as the minimum the next size would be 11 by  $15\frac{1}{2}$  inches, and for longer charts 11 by  $22\frac{1}{2}$ , 11 by  $29\frac{1}{2}$ , etc. This method would permit the binding of any charts extending over long periods so as to permit their being unfolded without being taken out of the binder and without cutting away any of the binding margin.

*Standard size for chart fields.*—Taking the minimum sheet of 11 by  $8\frac{1}{2}$  inches and leaving  $1\frac{1}{2}$ -inch binding margin at the left, with 1-inch margins at the top and bottom and 1-inch margin at the right, would give a chart field 9 inches high by 6 inches wide. We recommend that this be the basic chart-field size. This size provides a liberal margin at the right-hand side to overcome the tendency to extend the lettering to a point at the left where it is difficult to read on account of the binding. The 10-year data charts by months

would then take a field 9 inches high by 12 inches wide, which would fit with ample margin a sheet either 11 by 17 inches, exactly double the letter size, or a sheet 11 by 15½ inches, which allows folding in a binder with the least inconvenience.

*Standardizing vertical rulings.*—The most common associated statistics deal with monthly data, 12 of which constitute the major ruling unit separating each year. There is no particular reason why years should be shown in inches, but there are several reasons for showing months in convenient space. One-twelfth of an inch distance between monthly verticals is almost too small a space to commend itself for general use. We therefore recommend that in time charts the vertical space be divided in tenths of an inch, which would make the year spacing 1.2 inches. Leaving an extra wide margin on the right-hand side of the chart makes the chart presentable. But, if necessary, this wide margin would be invaded or even if it were not filled up the most rigid waste eliminator would not begrudge the white space that gives good opportunity for explanatory lettering.

*Standard scales of enlargement or reduction.*—With chart fields standardized as above the committee believes that scales of enlargement or reduction should likewise be standardized. For reductions the committee recommends scales of one-half, one-third, and one-fourth, and for enlargement the committee recommends scales of two, three, and four times. If a chart is drawn on a standard chart form and the scale of reduction or enlargement from the standard size is specified in the reproduction of the chart, the relation to other charts could be easily visualized.

Another reason for adopting the above standard scales is that in the reproduction of a logarithmic curve the above reductions would automatically show the curve of the square, cube, and fourth roots of a given series, while enlargements as above would automatically show the corresponding square, cube, and fourth power, measured in a vertical direction in each case.

In addition to the familiar arithmetic chart, the logarithmic or radio chart has come into vogue rapidly as showing a truer comparison of the rate of change, since these charts indicate by the slope of their curves the percentage difference rather than the absolute difference. They are particularly advantageous for comparing data measured in different units, or data whose curves are far apart on the scale. The above committee, although referring to the saying that "the greatest trouble with logarithmic charts is that many people stumble over the log and fail to see the rhythm," advocates the promotion of its use owing to its many advantages for analysis and comparison over arithmetic charts. The committee recommends standard deck ruling of 9-inch height for one deck, 4½ inches each for two decks, and 3 inches each for three decks, the latter ruling being preferable, owing to the need usually found for three decks. Logarithmic charts are now being used regularly by the Label Manufacturers' National Association, the National Association of Steel Furniture Manufacturers, and the National Automobile Chamber of Commerce.

Standard colors and shading, applicable mainly to maps and bar charts indicating a division of the data into percentage groups, have

been worked out by a committee of the National Distribution Conference held under the auspices of the Chamber of Commerce of the United States in Washington in January, 1926. These standards are presented in the report of Committee III of that conference, the committee dealing with market analysis and advertising. The committee on statistics of the American Trade Association Executives is also studying standard types of lines to represent certain items, such as certain symbol for production and another for stocks. No definite conclusions have yet been adopted.

The American Society of Mechanical Engineers is sponsoring the standardization of graphic presentation under the procedure of the American Engineering Standards Committee, and several trade association executives are represented on its committees.

### IMPROVING THE REPORTS

Once an association report is established it should not be allowed to lapse into a pure routine. Improvements can be made in most reports from time to time, and the association secretary can greatly enhance the value of the service by being on the lookout for improvements along the following lines:

1. Reports from more concerns.
2. Regular instead of spasmodic reports.
3. Earlier reports.
4. Reports on additional items.
5. Reports on related industries, in cooperation with their associations to reciprocate in furnishing similar information.
6. Classification of terms, to compare with other reports.
7. Methods of utilizing the results.

Reports should not be changed too often or comparability may be destroyed. On the other hand, frequent discussion of the value of the reports with individual members may not only secure earlier and more regular returns but may also give the association secretary ideas on how the members use the reports and how they might be improved in practical application. A campaign of education of trade association members in the uses of statistical data should not only make the reports of greater value to the members themselves but might well result in a more appreciative interest in this phase of association work and in the secretary's receiving valuable suggestions which previously lay dormant because of lack of knowledge of the application of the statistics to the problems in hand.

The uses and interpretations of business statistics, as explained in the earlier chapters of this booklet, should be of great help to association secretaries as suggestions for their own members.



## JOINT COLLECTION WITH CENSUS BUREAU

In some industries the members of an association, taken as a whole, are not representative of the industry, and, with the rest of the industry aloof, statistical data would not show true conditions. To meet such situations, the Department of Commerce, through the Bureau of the Census, has offered its facilities to obtain complete figures for the industry concerned. If a sufficient number of firms outside the association agree to send their figures regularly and promptly to the Bureau of the Census, the bureau will combine into a comprehensive total these data and the figures supplied by the association for its members. A tabulation covering these grand totals is issued promptly each month. The outside firms agreeing to report this information must be sufficient in number so that no individual's report may be disclosed and sufficient in their total importance to justify the additional work involved. At the present time, the Bureau of the Census is combining association reports with those of nonmember firms in nine different industries covered by the following associations: National Automobile Chamber of Commerce (automobiles), Paperboard Industries Association (box board), Enameled Sanitary Ware Manufacturers' Association (enameled sanitary ware), Steel Founders' Society (steel castings), Central Fabricators' Association (fabricated structural steel), American Erectors' Association (fabricated steel plate), Associated Tile Manufacturers (floor and wall tile), and the Sheet Metal Ware Association (sheet metal ware).

In many industries where no organization is available to collect statistics, the Bureau of the Census has gathered data for the entire industry. In some cases this collection has been placed upon the bureau by law—as, for example, in the cotton, tobacco, and leather industries—but in most cases it has been the result of requests by representative firms in an industry, through either an association or a special committee, for current data which could not be obtained from other sources. In order to start such statistics for an industry, the bureau must be assured of participation in the reports by at least 50 per cent of the industry, based on output. With this nucleus of the industry in agreement on the data desired and pledging themselves to report regularly and promptly each month, the bureau is in a position to circularize the entire industry to obtain additional reports. All individual reports are made in strict confidence to the Bureau of the Census and are examined only by sworn employees of that bureau. Only the grand totals of all reporting firms are published in the tabulated statements. Outside the reports made in combination with trade association figures, as mentioned in the previous paragraph, the Bureau of the Census is collecting directly from the individual firms, at monthly or quarterly periods, statistics on

28 industries. The trade associations covering the particular fields have been of great assistance in supplying lists of producers, in securing agreements to report, and in making suggestions as to the information to be supplied on the blanks. In this manner many industries now have available current statistics on their business which would not otherwise be possible. In some cases requests to the Census Bureau which would have involved the collection of data for several thousand firms in a widely diffused industry have had to be laid aside, owing to the large amount of work involved.

### MEETING OBJECTIONS TO REPORTING

A considerable problem to be faced in a large association is the indifferent or even hostile attitude of many firms toward statistics. Some of the most frequent objections to statistical work are listed below, together with the replies which have been made to them:

1. *The possibility of disclosure of individual data to others.*—The methods of obtaining secrecy of individual reports have been outlined elsewhere in this chapter. In reporting to the Bureau of the Census, as mentioned above, a heavy penalty is provided by law against disclosure of individual operations.

2. *Too much trouble involved.*—If the forms are made out in a simple manner, with the month and firm name or code already filled in and a self-addressed envelope provided, it takes only a minute or two for a clerk to copy the figures from the firm's records.

3. *Multiplicity of reports.*—Although most of the larger firms have many demands made upon them for all sorts of data, an investigation by the Bureau of the Census of the reports which large firms throughout the country have to make shows almost no duplication, and little chance of cutting down the number of regular reports without sacrificing information which the same industry greatly desires. The compilation of current reports rarely causes any trouble, because the reports are simple and regular. The complaint against the multiplicity of reports is usually directed against the different requirements of various States for reports on the same subject and against the many miscellaneous inquiries for special data.

4. *Questionable legality.*—The matter of association statistical activity has been greatly clarified by the decision of the United States Supreme Court, rendered in June, 1925, in the maple flooring and cement cases. A careful study of these opinions will reveal the highest court's pronouncement on the legality of statistical activity. This matter is discussed in Chapter IV of Trade Association Activities.

5. *Publication of the totals may disclose individual operations.*—If the figures are compiled with due care that no data are presented wherein only one or two firms contribute figures or wherein even

several small firms added together would not change materially the totals of one large firm, there should be no valid complaint on this score. The Bureau of the Census makes it a regular rule not to publish separately any data for which less than three reports are received.

6. *Plant too small to affect the totals.*—Although any one plant's operations may be so small as not to have any effect on the combined total, if all the small producers maintained this attitude the totals might be seriously affected. Not only do the small firms in most industries make quite a showing in the aggregate, but in many cases the trend of the small firms is different from the trend of the larger firms, and thus their figures are vital to a true picture. For instance, in the fabrication of structural steel the fluctuations occur almost entirely among the larger firms, while in lumber manufacturing the fluctuations are due rather to the small firms who cut lumber when prices are high but stop work altogether when the situation is not advantageous. The reports of the National Machine Tool Builders Association are classified by sizes of firms to show these differences in trends.

7. *Gives information to buyers to beat down prices.*—The publication of statistics will give information to the buyers, but it will be of still more benefit to the selling industry. The buyer may at times gain better prices through the use of these statistics, but at others the seller will be enabled to get a better price. This matter is fully discussed under "Publicity" on page 80.

8. *The statistics are of no use.*—The many uses of statistics can be explained and particular application made to the industry in question. Often an official may think that a certain set of statistics is of no value, and yet another department of the firm may have written the Government asking for the identical information.

9. *Records not available.*—In many cases, where a firm does not have accurate records, a close estimate will be sufficient. However, figures taken from records are more accurate, and the advantages of keeping such records, not only for purposes of compiling the industry reports but for the firm's own guidance, could be explained.

10. *Unable to decide about reports.*—This is usually only an excuse to put off the question, since there is practically no expense involved and no question of policy.

11. *Other firms may falsify figures.*—So many business data exist against which any industry's figures can be checked that such actions can often be discovered in editing the reports. Besides, data not manifestly wrong and yet incorrect, if presented by any but a large firm, would not seriously affect the total. Often mistakes occur through misunderstandings, but careful editing and checking will usually discover cases of wrong figures. In cases of doubt as to the

correctness of the figures, the association secretary should immediately get in touch with the firm concerned and explain the discrepancy or question.

12. *Benefit foreign competitors.*—This usually is not a valid argument, since practically all industries give out their figures and have not suffered from foreign competition because of the practice. American industry gives out many more figures than any other country and suffers less from foreign competition. Import and export figures have always been published without any question being raised as to their aiding foreign competitors. In fact, such figures might discourage foreign competitors. Finally, the American firms have the advantage in any case, owing to their possessing the data earlier.

