tions on methods. The makers of this questionnaire respected such carefulness; and believe that unqualified answers reveal nothing that could be used by competitors. Evidently the few who answered that it was not customary to give out information regarding their business methods or practices did not "read the questions"; some of these same objectors further proved their business acumen by inclosing catalogues and even samples of their products.

The surprising feature of the tabulated replies is that so many are affirmative. Scientific management has, to the representative executive of modern industry, come to include the study and interpretation of statistical evidence. To be sure, there are a few adherents to the old faith in executive judgment, who "would go crazy if they had to follow up and consider all the statistical studies suggested." We respect these men for their success, and we agree with them that statistical methods cannot substitute for less scientific but more experienced decisions.

The returns, as should be expected, show that the nature of the business determines the relative importance of the different statistics. The number of answers received from the extractive industries[1] is too few to make the conclusions more than tentative. Apparently statistics of labor and of purchases, and the least complex sales statistics are useful to these industries; statistics of overhead charges, credit, and financing are considered as relatively unimportant.

Mercantile business,[1] including chain stores and wholesalers, usually has no production problem, and so labor statistics are not so important. Statistics are used in guiding purchases; overhead may be an important expense factor, but apparently is mathematically reckoned by less than half the mercantile companies replying. Sales, advertising, demand, and credit are all very important.

The division of manufacturing businesses, for which the questionnaire was primarily prepared, into "cyclical" and "stable" was made in an attempt to form a separate group of those who from the character of their products would be most directly and impressively affected by the business cycle and hence would find the need for cyclic statistics more urgent and the procedures most helpful. Our figures (opposite) show that a larger fraction of this group employs statistical services and that the ratio of affirmative to negative responses is higher than in the stable group or than in the total. Even this does not tell the whole story since the percentage of replies was largest in the case of manufacturing concerns whose business could be considered cyclical.

The totals of the affirmative and negative answers for the questionnaires completely filled out are most significant, indicating the attitude of business in general toward scientific statistical work in connection with management. Under the head of Labor, business men are most interested in finding whether or not an increase in production has been accompanied by a proportionate increase in labor force. The remarkable vote in this division is on the determination of wage rates in accordance with the cost of living. Less than one-third make any such calculation, and some of these pioneers admit half-hearted methods. "Very many businesses are today watching the cost of living index, both United States and National Industrial Conference Board, watching and using, but not varying wage rates directly with the change in cost of living." This may be due to unionization or to the impracticability of the method. At any rate, the answers should be suggestive to the executive who believes that everything possible has been tried to meet the wage demands of labor.

The purchasing department is well established in big business but the possibilities of statistical guides in purchasing apparently have not been so generally recognized as would be expected. Few agents use mathematical correlation; possibly graphic comparison is more satisfactory. Probably the devise of correlation will be more appreciated when it is better known. Sales management more frequently employs mathematical and statistical methods of direction.

Advertising gets a vote of confidence; yet only sixteen of seventy-three firms set aside during easy sale periods a surplus for advertising when sales resistance is greater. It would seem to an observer, at least, that such a policy would be very sound and profitable. Moreover, it is quite astonishing to learn that one firm in two, of those replying, "employs statistical methods or standards to measure the efficiency of particular media for given periods." This question was checked by a letter addressed to some of the principal advertising men in the East and Middle West. No one of them claimed to have developed any such exact test of media as this question indicates, and most of them frankly doubted the practicability of any such procedure. Their doubt is here refuted by the testimony of

[1] Ten scattered replies were received from questionnaires sent to mercantile concerns and extractive industries. These are not detailed in the table (Fig. 1) but are included in the totals given.

## QUESTIONNAIRE: THE USE OF STATISTICS IN BUSINESS

| | Analysis of Replies | | | | | |
|---|---|---|---|---|---|---|
| | Totals | | Manufacturing | | | |
| | | | Cyclical | | Stable | |
| | Yes | No | Yes | No | Yes | No |
| **I. PRODUCTION.** | | | | | | |
| **A. Labor.** | | | | | | |
| 1. Do you employ mathematical and statistical methods to determine: | | | | | | |
| a. Whether or not an increase in production has been accompanied by a proportionate increase in labor force? | 61 | 15 | 41 | 9 | 11 | 5 |
| b. The effect of overtime on the ratio of output to labor volume and to unit production costs? | 35 | 41 | 24 | 26 | 6 | 10 |
| c. The relative efficiency of labor in various stages of the business cycle? | 37 | 39 | 26 | 24 | 6 | 10 |
| d. The amount and expense of labor turnover? | 46 | 30 | 32 | 18 | 8 | 8 |
| e. The proper balance of labor force and a given plant equipment? | 41 | 35 | 30 | 20 | 6 | 10 |
| f. The relation between deviation from this balance and the rate of profit? | 26 | 50 | 18 | 32 | 6 | 10 |
| g. Future wage rates in accordance with the trend of the cost of living as shown by an index such as the Department of Labor compiles? | 23 | 53 | 17 | 33 | 2 | 14 |
| **B. Purchases.** | | | | | | |
| 1. Do you use mathematical and statistical methods to determine: | | | | | | |
| a. The most profitable time to buy in excess of current requirements, for future production? | 45 | 31 | 28 | 22 | 10 | 6 |
| b. The time when buying should be for minimum stock requirements? | 46 | 30 | 29 | 21 | 10 | 6 |
| Note: If your answer to the preceding questions is "Yes," do you use mathematical methods of correlation? | 18 | 56 | 12 | 38 | 3 | 11 |
| **C. Overhead.** | | | | | | |
| 1. Do you use mathematical and statistical methods to determine: | | | | | | |
| a. Whether changes in overhead, or burden, ratio have been due to changes in operating efficiency or to changes in external conditions? | 42 | 34 | 33 | 17 | 5 | 11 |
| b. The relation of overhead charges to the business cycle; the extent to which overhead increases or decreases in the different phases of the cycle? | 32 | 44 | 24 | 26 | 5 | 11 |
| c. The effect of overtime on burden ratio to judge expediency of accepting orders that necessitate overtime? | 31 | 45 | 25 | 25 | 3 | 13 |
| d. Possibilities of increasing rate of turnover of materials? (By use of a control board, for instance?) | 46 | 30 | 35 | 15 | 8 | 8 |
| **II. MARKETING.** | | | | | | |
| **A. Sales.** | | | | | | |
| 1. Do you use mathematical and statistical methods: | | | | | | |
| a. To provide knowledge of secular trend (or the growth factor) in sales of each line of goods? | 52 | 24 | 36 | 14 | 8 | 8 |
| b. To find seasonal fluctuations or monthly relatives in sales volume, to predict future probable sales for any particular month? | 56 | 20 | 40 | 10 | 9 | 7 |
| c. To find relation of sales volume to sales costs at varying seasons and phases of the business cycle? | 47 | 29 | 31 | 19 | 10 | 6 |
| d. To forecast the probable demand for your products? | 50 | 26 | 32 | 18 | 11 | 5 |
| **B. Advertising.** | | | | | | |
| 1. Do you consider advertising a large force in the creation of demand for your product? | 52 | 24 | 32 | 18 | 12 | 4 |
| 2. Do you employ statistical methods or standards to measure the efficiency of particular media for given periods? | 34 | 42 | 22 | 28 | 7 | 9 |
| 3. Do you set aside during prosperous years a reserve for advertising purposes during slump periods? | 16 | 60 | 11 | 39 | 2 | 14 |
| **C. Demand.** | | | | | | |
| 1. Do you employ charts showing the course of: | | | | | | |
| a. Monthly sales? | 64 | 12 | 44 | 6 | 12 | 4 |
| b. The price of your product? | 48 | 28 | 32 | 18 | 10 | 6 |
| c. The physical volume of business? | 58 | 18 | 40 | 10 | 11 | 5 |
| d. The consumer's purchasing power? | 20 | 56 | 14 | 36 | 2 | 14 |
| e. The future trend of your business? | 37 | 36 | 23 | 27 | 8 | 8 |
| 2. If you do use such charts, does your planning department use appropriate mathematical methods when calculating the estimates to allow for: | | | | | | |
| a. Secular trend or growth factor? | 26 | 50 | 18 | 32 | 4 | 12 |
| b. Seasonal variation? | 37 | 39 | 26 | 24 | 6 | 10 |
| c. Cyclical factors? | 27 | 49 | 19 | 31 | 4 | 12 |
| 3. Do you use the turnover of bank deposits as an index of buyers' purchasing power? | 16 | 60 | 10 | 40 | 2 | 14 |
| **D. Credit.** | | | | | | |
| 1. Do you correlate the credit losses of your business with the stages of the business cycle, in order to adjust your credit standards to changing hazards? | 29 | 49 | 16 | 33 | 6 | 10 |
| **III. FINANCE.** | | | | | | |
| 1. In marketing your securities do you use statistical methods of determining how far needs should be anticipated in order to take advantage of periods of low interest rate? | 15 | 60 | 8 | 42 | 4 | 11 |
| 2. In presenting the financial condition of your company to your bankers, do you use statistical tables and charts showing ratios, trends, and seasonal variations, as supplementary evidence of conditions and prospects? | 16 | 59 | 11 | 39 | 3 | 12 |
| **IV. ADMINISTRATION (Plant Expansion).** | | | | | | |
| 1. Do you prepare plans for future expansion based on the projection of the secular trend (growth) line of your business? | 25 | 50 | 17 | 33 | 4 | 11 |
| 2. Do you control your building program by reference to statistics showing the deviation of building costs from the trend? | 14 | 61 | 9 | 41 | 2 | 14 |
| Note: If your answer is "Yes," do you use standard deviation *or* average deviation as measuring the limits which alter your policy? Please designate which measure is used | Average deviation preferred. | | | | | |
| Is there some one in your organization who acts as an economist or statistician? | 37 | 38 | 27 | 23 | 6 | 9 |