

how I could better this condition, our department was requested by our executives to start on budget control for the whole organization.

This, of course, was the one thing needed to make our forecast definite and practical and a means to a more intelligent control of our plant, through knowledge of what business is likely to be in the next twelve months of the budget period. I shall not go very deeply into the subject of budgeting because that is not the subject I have been asked to speak on but it is necessary to refer to it, as budgeting is the logical sequence to forecasting and the one helps the other. Without forecasting, our executives could know what we were capable of producing but they could not tell very definitely whether general business was going to be good or very good, or whether the majority of our business would come in the first half year of the last. In other words, they could not know what part of the business cycle we were in. This we could easily show them with our own charts in conjunction with the other curves with which we ran in phase. Most people seem to think that we always travel in a straight line and that it will be an easy matter to increase sales a little next year, although we may be at the peak of a cycle and likely to go down.

Our procedure on our estimates or forecasts is to complete our budget by November; that is, our budget for 1926 was completed in November, 1925. Our forecasts are made fifteen months in advance. The current year, or we will say 1925, is projected to get the totals for 1925 and then our extensions for the whole of 1926 are made. As I stated before, our forecasts or estimates are all contained in the budget.

The Budget Committee meets and discusses the various estimates, so that Sales, Production and Financial heads, may study these estimates. The Budget Committee holds a second conference a few days later and either recommends that the budget figures be accepted as they stand or suggests slight changes. Usually the budget is not changed, the feeling being that the Statistical Department has made very careful studies and has given a fair, logical estimate and one not too easy of attainment; that it is thoroughly familiar with plans and policies of other departments and has made due allowance, for example, for a number of new salesmen who may be taken on during the year, the advertising policy or any other matter pertaining to the sales policy for the next year.

The value of these forecasts to our executives may be briefly stated as follows. They tell the General

Manager (who is also Budget Manager) how the various divisions, such as Sales, Production and Finance, will function monthly throughout the year, supplying him with a measuring stick with which to check their actual attainments. He has a complete picture of the next twelve months in advance which enables him to see that the way is smoothed and cleared to attain these budget figures.

The budget is not centered on merely increasing sales but puts as much emphasis on reducing expenses. The gradual increase in sales and decrease of expenses by budgeting is, of course, largely due to the team work which the budget brings out. In other words, everyone in the organization is striving to make our sales for the year a certain definite amount, the budget figures for sales. As we are all striving for the same figure, we reach it. We are all pushing in the same direction, not pushing certain articles and forgetting others, not striving to sell too much in a certain territory that cannot assimilate it, thereby increasing selling expense, and forgetting another section of the country which can take it. Our ability to do this comes through research in the field and into each department in our organization.

As to expense the head of each department goes over the figures and agrees to the sum set for his department. He sees it is not too low to handicap the department but that it will require care to keep within it, and he does keep within it. If there is no figure set for his department's expenses, they will surely creep up. If no one is watching expenses very closely, clerks ask for various things they do not particularly need and, year by year, the department's expenses increase. The budget gives everyone something definite to attain—not easy, but attainable.

The next executive concerned in the budget is the Sales Manager. The budget gives him his sales in quantity and amount by states or any combination of states he may desire, with which he can check in a short time, and thus frees more time for other sales problems. Sales executives are salesmen and not calculating machines, and they are not familiar with the various statistical methods necessary to form a sales budget. Estimates made by the Sales Department are likely to be high. The necessity and advantages of a sales budget to the sales executive are so obvious that it is not worth while to state them further.

The Production Manager takes the budget estimate in quantity and checks against it his monthly production capacity to see whether he has enough machines

and men if a good year is expected; or, if the reverse is anticipated, to reduce his force and trim his sails gradually. He is enabled, from the budget, to produce at a much more even curve throughout the year, eliminating many of the peaks and using a smaller force.

Purchase of raw material can be handled much more advantageously as to price when you know in advance what will be required. Forecasting also avoids building up a high inventory of raw material should a slump occur, as it would have been anticipated.

The Treasurer knows in advance how his receipts and disbursements will come, by months, and can do his financing accordingly.

This very briefly outlines forecasting and budgeting at our plant. You will be interested to know how accurate our forecasting has proved to be. For 1924, the percentage of error was as follows: orders received, 5.06; sales revenue, .63; expense, 1.00. For 1925 the percentage of error has been: orders received, 3.21; sales revenue, 2.96; expense, 1.52.

## II. By S. L. KEDERSKI

ONE of the principal characteristics in the present-day economic structure is the instability of business activities from year to year. Instability is manifested not only in general business but likewise, in individual businesses. Business activities are always either increasing or decreasing; they never stand still. Since these conditions in the long run affect profits, because prices are either rising or falling, the changes of business activities are of prime importance to every industry. Therefore, accurate statistical measurements are vitally necessary so that an analysis can be made of these movements, and interpreted.

The most common and the easiest way to analyze business data is to compare superficial data for a current month with the corresponding figures, either for the same month of last year or for the preceding month of the same year. Comparisons between different months of the same year, or between the same months or periods of different years are also sometimes made. These direct comparisons of business data are in most cases likely to lead to more or less inaccurate or misleading conclusions, because of the presence in the unrefined data of two influences, namely, seasonal variations, which affect the accuracy of the comparison of the figures for the current

month with those of the preceding month of the same year, and normal growth or long time trend which affects the comparison of the current year with other years.

As an illustration of this point, take, for example, the saw business. The number of orders taken for our Alpha Products for the month of November is reported 15 per cent less than the number in the preceding month of October but 10 per cent greater than the number of orders in the month of November of the preceding year. This comparison with the preceding month does not necessarily show any unfavorable sign for the month of November, because orders for our Alpha Products in November are usually less than those in October as a result of normal seasonal changes. In the comparison of November with the same month of the preceding year, the effect of seasonal influences is mostly eliminated, but no allowance is made for long time growth. Although the orders for Alpha Products are 10 per cent greater than those of the corresponding month of the preceding year, it does not necessarily mean that there is a satisfactory improvement over last year. If the normal annual increment or growth in our Alpha orders chanced to be greater than 10 per cent, the orders in the current November would be unfavorable rather than favorable.

Consequently, when dealing with business data in which the influences of long time trend and seasonal variations are apparent, it is necessary to eliminate the effects of these influences before accurate analysis can be derived. It is the purpose of my talk, gentlemen, to attempt to describe a statistical method whereby the effects of these forces can be entirely eliminated.

The statistical method for analyzing monthly data of business activity which I shall endeavor to explain was originally devised by Professor Warren M. Persons of Harvard University. His method makes it possible to measure the influence of the principal elements which underlie changes in business activity and to disintegrate and examine in detail the effects of any particular group of forces. It is through analysis of various basic industries that we ascertained with some precision the causes of the ups and downs of our industry and on such basis were able to project our curves one year in advance.

In order to compare our industry with those which vitally influence it, it is necessary to reduce the rough or crude figures to a comparable basis. There