

have been united, one of these companies being the consumer of the other's products, or when a large company has added a new department to take care of a stage in production either before or after that previously handled?

b. What is the significance of the decrease in factory employment accompanied by an increase in output? To what extent is this increase explained by increased efficiency of the individual worker, by more careful selection of workers, or by greater use of machinery? What are the results on supply of factory labor, consumer demand due to reduction of number of workers receiving pay envelopes, and increased need for measures to relieve the unemployed?

3. *Analysis of Internal Conditions.* The two preceding kinds of research have to do primarily with the world outside the particular company. Another appropriate field for the activity of a unit or department devoted to research for general administration is the analysis of internal conditions affecting more than one department or function. The purpose of such analysis is to investigate and report on the internal operations of the company so as to facilitate wise decisions as to major questions of policy. A helpful element in these investigations is comparison with figures for outside concerns.

Among the typical problems of this kind the following may be mentioned:

a. Will it be more desirable for the company to continue to purchase items of a certain class or to manufacture them? It is obvious that light may be thrown on this question by the investigation of vertical integration of industry.

b. What have been the price trends of what we buy and what we sell, in such form as to permit fair comparison with general price trends?

c. Are the changes in price of our product accounted for by changes in costs of our raw materials and labor, and by increased efficiency?

d. What obligations has the company already incurred under its pension plan, and what will be the annual increase in such obligations? What method of providing for these obligations is desirable? This problem is related both to the accounting function and the personnel function.

e. What is the typical rate of increase of employee earnings with increasing service? Is this condition satisfactory, in view both of what other companies do for their employees and the necessity

for maintaining production costs at as low a level as possible?

4. *Standard Control Ratios.* The types of research mentioned above are concerned with the formation of general plans and affect the board of directors especially. Another type of research fits in more closely with the job of the president. In order to control the progress of the company, to see that policies are being carried out and to call attention to places in the organization which require special executive action, it is desirable to follow currently certain key ratios. Before such ratios can be used to advantage, research is necessary to develop the true significance of particular values of these ratios. For instance, one of the important ratios used in railroad administration is average number of miles per day for each freight car. By comparing the current result with an average for earlier periods or for similar roads under similar conditions, the executive is able to detect unusual conditions. It is not safe, however, for this comparison with previous experience to be made on a superficial basis, or to accept without investigation the opinions of "old timers," which are probably not sufficiently modified to reflect changed conditions. It is sometimes advisable to check a suggested scheme by using it informally for a while before making it a basis for executive action.

Railroad administration is full of ratios which are used for control purposes, such as revenue per ton mile, cost per ton mile, ton miles per engine mile and percentage of bad order equipment. Other questions which call for determination of ratios are as follows:

a. What return on investment is reasonable and fair for a manufacturing subsidiary of a public utility?

b. What ratio of current assets to current liabilities is advisable for a concern such as John Doe and Company?

5. *Appraising the Work of Departments.* Another kind of research of a more difficult and controversial nature is the development of methods for appraising the work of major departments. In most organizations at present the judgment of the chief executive as to the effectiveness of a department depends largely on personal impressions and a rather vague evaluation of its performance. The records tell, especially if control ratios have been developed, more or less about what the department

has actually done, but give a less definite analysis of the obstacles which were overcome and the resources available to overcome them.

In spite of the indefiniteness of the information available, the chief executive is continually required to decide how satisfactorily each department is doing its work and which department heads should be transferred to other spheres of usefulness. It is therefore desirable to work out methods by which he can form a more scientific judgment and such methods are in the process of development in a few special industries. They are not yet developed, however, as a general procedure. One of the major difficulties is a natural result of the fundamental nature of the problem. A good method for evaluating the success of a particular department may show that it is much overmanned, or that the head of the department is grossly incompetent. Human nature being what it is, it can hardly be expected that department heads will be enthusiastic about helping to devise searching tests of their own efficiency.

One obstacle which has hindered an adequate development of methods for testing departmental efficiency is the notion that a supervisor of any grade should know as far as possible all the details of the work done by his subordinates and can measure their performance only by being able to do a better job himself. As long as this omniscience is the ideal, it is difficult to develop practicable methods. The truer view seems to be that while detailed knowledge is helpful, higher executives can seldom know their subordinates' jobs as well as the latter do, and success in executive work depends on acquiring skill in watching results and "spot checking" details rather than in attempting to follow every step.

It seems clear that the most successful line of attack on the problem of developing general methods of appraising the work of departments lies in developing a large number of measures, each subject to limitations and requiring skillful interpretation. A most essential thing in working out such measures is an objective attitude and a clear realization of the exact function of each department in the organization.

Typical problems are as follows:

a. Has the advertising department spent more or less than was justified? (The answer to this question is especially difficult if the advertising is

of the so-called "institutional" type, of which the object is to develop good will rather than to sell specific items.)

b. Is the purchasing department doing a good job, allowing for the way that instructions have come to it from the sales and manufacturing departments, and for market fluctuations in price?

6. *Combination of Several Types.* It is clearly desirable to try to solve management problems in the form in which they come to the general manager. Even though the problem might be broken down into parts, each of which could be classified under one of the types discussed, the real desideratum is not the solution of these partial problems, but the co-ordinated answer to the original question in the form it actually occurs, so as to furnish the best available guidance to those responsible for executive decisions.

As the problems of this type are made up of a combination of problems of the types previously discussed, the methods to be used are a combination of all that have been mentioned—historical, mathematical, statistical and economic.

The following typify the problems which we would classify under this head:

a. What estimated rate of activity in this industry (especially for this company) should be used as the basis for budget and other forecasts? (Combination of Types 1, 2 and 3). A valuable guide in dealing with this problem is the discovery, by the use of the statistical method of "correlation," of series whose fluctuations precede those of some series measuring the activity of this company or industry.

b. What policy should be adopted in regard to setting up depreciation reserves for plant and machinery? This problem really involves both the second and the third kinds of research noted above, as the appreciation of the need for a systematic depreciation policy involves both an understanding of the way industries have faded away, either as a whole or in particular localities, and an analysis of the replacements which have been or are likely to be necessary in the particular plant because of wearing out, obsolescence, or inadequacy. An understanding of economics will also answer the objection that depreciation is a question of accounting rather than general administration, by bringing out that the chances of ultimate success or failure, and the propriety of a particular rate of dividend,