the cost posted to the cost sheet. Adequate checks are provided to insure all proper charges on an order and to prevent improper charges.[4]

An important feature of this scheme is that the order or account to which labor or materials is to be charged is predetermined by a qualified person and not left to the judgment of workmen, foremen or circulating time-keepers.

The plan as developed for manufacturing can readily be adapted to the installation of meters, the reading of meters, construction of transmission and distribution lines, a large proportion of maintenance work, the installation of new machinery, etc., etc.

The basic features of the system of classification and accounting, including the technique of allocating general or indirect expenses, impress me as being peculiarly suited to the needs of the utilities. This viewpoint is supported by the trend or drift to which I have referred.

Recent papers on the subject would seem to indicate that attempts are being made to work out a plan to utilize the same ratios or formulae in the allocation of costs to classes of service by any or all electrical utility companies. I am of the opinion that any such average or general formula based upon the entire industry will be of little value. In industry it has been found that the rates for distributing indirect expense must be individually worked out for each company even within the same field. Identical machines in two different departments may have different rates. The same need for working out rates for individual companies in the utility field will, I believe, be found. For example, there would seem to be little in common between the distribution and commercial costs for residential customers in New York City proper and the City of Philadelphia. In one, apartment houses and tenements prevail, while in the other there is a preponderance of individual homes spread over a much greater area. Nevertheless, with better classification in which the main class of "residential" business would be broken down into significant subclasses, useful comparisons of the same kind of service in different communities could be made.

There is also evidence in recent utility literature that, in view of permissible earnings and hence rates indirectly being governed by invested capital, the matter of allocating investment to classes of service has been receiving considerable attention. As a matter of expediency this may not be criticized. And it must be said that in principle the methods of allocation are essentially the same as I have described in industry. Costs of service do not, however, necessarily bear any proportionate ratio to the capital investment involved. In industry, return on invested capital would be a very unsatisfactory basis for governing earnings. After all it is but one factor among many. Costs of each class of service in which capital investment is included, through depreciation and interest, would seem more satisfactorily to serve the purposes of both the regulating bodies and the utility managements, and to eliminate expensive controversy.

[4]For detailed discussion of system of planning and control, see *Scientific Management in American Industry*, by the Taylor Society, New York and London, Harper & Brothers, 1929.

Value to Management

The value to management of such a system of accounting as I have outlined should be self-evident. As a practical manager I shall briefly sum up its advantages.

It facilitates: (1) measurement of performance in all branches and operations of the business against standards; (2) control over indirect expenses, comparable to that more commonly associated with direct expenses, and ready adjustment to meet increases or decreases in sales; (3) control over rate of operation and consequently expenditures of the business, including all forms of capital outlay; (4) control of inventories, keeping them within proper limits in relation to volume of sales and the avoidance of loss from obsolescence; (5) the focusing of attention upon relatively unprofitable products, small sales of profitable lines.

The idea is not new that cost finding and analysis along the lines that I have discussed should be made an integral and routine part of utility accounting and that the classifications which have, like Topsy, "just growed" from the original Interstate Commerce Commission effort should be rebuilt along more logical and usable lines. As far back as 1912 or 1913 I contributed to working out application of the Taylor methods of classification and accounting for a highly successful company in the field of utility management and later worked out in some detail a similar plan for another important company.

Some ten or twelve years ago in the *Electrical World* there appeared an article by W. J. Greene, P. C. Schoonmaker and C. B. Gorton describing an accounting system used by the Iowa Railway and Light Company. It largely conformed to that under discussion. These authors enumerated and discussed the advantages of routine cost finding as a part of accounting practice under the following heads: a guide for determining rates; a basis for cost-plus sales; a logical method for presenting costs in rate controversies; a method for determining costs of service in each town or city on a common transmission line; a measure for taking on new business; a measure for the extension of transmission or distribution lines; a method of determining the rate of return from a class of consumers or a city; a statistical knowledge of the business; a method of determining the efficiency of plant operation.

In concluding they said:

> The Iowa Railway and Light Company believes that an accurate knowledge of costs is essential to its further economic development and has arrived at the conclusion that, in addition to the generally recognized basic fundamental principles, there are other elements that have not been generally recognized in utility cost accounting and believes that these elements must be recognized as characteristics of public utility costs and must be used in connection with others as the foundation for the determination of unit costs.

More recently from within the utility ranks we find expressions indicating recognition of the need for development of cost finding as a part of utility accounting.

In the transactions of the National Electric Light Association, Volume XVII, 1930, will be found a paper on "The Significance of Price Economics to the Utility Accountant," by Herman L. Gruehn, Assistant Budget Manager of the United Gas Improvement Company. From this I quote:

> Up to the present time public utility accountants have been content to classify operating and capital costs according to the first cause for which funds were spent, as for instance, expenditures for coal, boiler labor, commercial labor, taxes, interest or investments in various types of capital equipment. But this classification does not correspond to the types of products which the company sells, consisting of electric energy in various forms in combination with the obligation to render continuous service up to specified demands; nor does it agree with the purposes for which the products are sold, such as residential lighting, power or other uses. Hence those responsible for selling the industry's product cannot now obtain from the accountant all the necessary cost data directly applicable for evolving class rates under which service is sold. . . .
>
> When treated according to the economic principles of price it is believed that such cost data should prove a valuable tool in solving the problem of increasing productivity of the investment dollar.

In the *Electrical World*, April 11, 1931, under the title, "Basing Rates on Cost Allocations," Mr. Adolph Raunenberg, Chairman of the Railroad Commission of Wisconsin, says in substance:

> There is little consistent application in allocating total burden between the various customers of a utility. Rule of thumb or gradual modification of old existing rates, makes for disorganization. The promotional rates have helped to increase the disorder. Critics too are in disagreement, some want the process of costing simplified and some more refined.
>
> The ideal is to assess each customer the true costs of serving him. It is improbable that sufficient data will ever be available to eliminate entirely all arbitrary opinion from any study of electrical costs. However, it does appear that an approach is possible which will reduce the influence of opinion and increase the influence of ascertainable data, so that the range of debatable difference will be substantially reduced.
>
> It has been the purpose of this study to avoid direct apportionment of different classes of consumers and to determine the costs of such apportionment in terms of the fundamental variables affecting costs. Then the costs of serving a given class of customers can be obtained by assigning to the various (classes) varying values which are characteristic of the class in question.

Many other papers, articles and committee reports, all having some bearing upon costs of service to various classes of consumers under various conditions, upon methods of allocation of general or indirect expenses and upon budgetary methods are revealed by a survey of utility literature. Mostly they have in mind, however, the building up of statistical guides as a result of detached analysis, rather than providing currently such information as a matter of regular and routine accounting practice.

Evidence of growing dissatisfaction with the existing classifications may also be found.

With declining cost, as a result of economic adjustment of physical equipment for the production and distribution of electricity, return on capital invested and particularly upon valuation may cease to be a desirable or even a fair basis for controlling rates or net profits. It would seem that the psychological moment has arrived for transferring the emphasis to cost of service, in which cost of invested capital is a factor.

Some twenty years ago Mr. Brandeis startled the country by the statement that the railroads might through scientific management save a million dollars a day.

I am inclined to believe that an equally great saving might be brought about in the electrical field if the scientific-management methods of classification and accounting together with scientifically established standards of performance were worked out and generally applied.