economic research; and they supplemented this information by investigations relating to their respective industries, conducted by their own economic research units. Smaller enterprises began to utilize the reports of professional statistical bureaus, which as a group appear to have become a permanent institution of information service to American industry.

Also general administrations began to give more serious attention to the already-established researches of production and sales departments. These were improved individually and brought into a relationship which made them more useful tools for co-ordination and control of departmental efforts. The most noteworthy objective result of this integration is the modern form of the budget. The primitive form, devised to control the use of funds in accordance with an allotment on the basis of arbitrary judgment, has now become an effective element of co-ordination based on researches relating to the market and its demand, sales facilities and costs, and production facilities and costs. The budget is to the enterprise as a whole what the operation order and instruction card are to the individual workplace.

The principle of standardization has proved of the greatest significance to the stabilization of an enterprise through general administrative control. In any area of managerial responsibility the basic fact has become clear that until the results of research are formulated in the form of standards of what is to be done and how, there can be no co-ordination and control, and no economy resulting from integration of individual efforts. Nowhere is this clearer than in general administration.

For its own purpose, therefore, it has come to demand of operating departments more and better standards. An effective budget must start with reasonably accurate forecasts of the probable activity of business in general, of the particular business, and of the sales of the items which it produces—in as predetermined quantities and prices as is possible. It must then be built up with reasonably accurate forecasts of all production costs involving predetermined requirements and costs of materials, machines, tools, labor and overhead. This is one reason for the rapid and widespread increase of time study during the past decade, and the development of mechanisms like standard costs.

The experience of scientific management in general administration has brought out an important fact, fundamental among the implications of this paper and pertinent to the general subject of this Congress, that the development of a technique of general administrative research, standardization and control indicates that there may be no limit to the manageable size of enterprises; that, if we learn our lessons of experience and develop our technique accordingly, probably whole industries and the grouped industries of national and international areas may be made subject to a manageable control. There are now in the United States and Europe consolidations of enterprises, diverse as to the nature of their products and geographically widely scattered, which are managed more effectively than even small enterprises were managed a decade ago.

This is because industry is learning how to achieve through research and standardization an effective balance between centralization and decentralization. So long as managerial customs, especially absence of standards, compelled the chief executive to make every decision, whether relating to policy or to specific performance, there was a limit to the effectiveness of central control. Under those conditions a point was reached where the losses from the inefficiency of an overloaded individual were greater than the losses resulting from absence of balance between decentralized operations. It was believed, that a size of enterprise could be reached at which inefficiency of one or the other kind would be inevitable, and therefore that there is a limit to manageable size.

But the progressive widening of the area of scientific management points the way toward a solution of the problem. On the one hand planning of research-determined purpose, policies and specific results, and provision of standard, research-determined facilities, can be centralized for any number of unit plants. The planning department of the general administrative offices of a group of integrated enterprises can establish standards of policy, purpose and specific results for the constituent enterprises considered as units, just as the planning department of the general administration of any of the unit enterprises establishes co-ordinating standards for its sales, production, finance, purchasing and personnel departments, and just as the planning department of the shop establishes co-ordinating standards for the unit workplaces in the shop. On the other hand the actual conduct of operations to accomplish the predetermined co-ordinated results may be left to those best informed concerning the variable conditions of accomplishment in the several local areas.

Furthermore, this harmonization of centralization and decentralization over ever larger areas of management has tended to bring with it greater democracy within the enterprise. Scientific management is realistic; as has been said, it attempts to establish a reign of the laws of a situation. To have validity and durability these laws must be found in the situation and not be imposed upon it from without. The process of discovering them in a situation and of formulating them for common observance according to logical relationships and responsibilities is an experience in co-operation, which is an experience in democratization. The harmonizing of centralization and decentralization is not unrelated to the progressive stabilization of industrial relations described in an earlier section.

It should be noted—a fact of transcending importance—that the ability to control huge multi-plant enterprises through harmonizing of centralization and decentralization is possible only where there is a preceding progressive development of scientific management in every lesser area of an enterprise; in unit operations, production in general, merchandising, general administration and human relations. It is the splendid fruit of these basic developments. Control of such huge enterprises is dependent on controls throughout every unit of the enterprise; the larger an area of control, the more essential is control in every constituent unit. Therefore effective rationalization of an entire industry, or of all industry in a nation, is possible only to the degree that constituent plants are scientific management plants.

It is therefore apparent how fundamental are the principles derived from the technique first developed by Taylor, the young assistant foreman, to co-ordinate and control a small group of machines in the shop at Midvale back in the early eighties. He summoned inductive science to his aid. Investigation and experiment disclosed a new world of facts and principles. In the light of these principles he established a new, universally-applicable technique of management, involving research, standardization, control and co-operation. Although devised to solve the problem of managing only a small group of machines, this technique is so fundamental that it has been applied progressively to management of the entire shop, to management of the entire enterprise and to management of groups of integrated enterprises.

So much for individualistic enterprise. But there remains the inevitable question: Can society adapt this technique to the management of its industry on a still larger scale—collectively—at the same time preserving the values of individual initiative and self-expression as they have been heretofore preserved in the onward march of scientific management?

II. Future

Stabilization of an Industry

The United States has not had experience in the stabilization of entire industries. That has been impossible because of a philosophy of individualism and competition which dominates public opinion and is expressed in legislation. An outstanding characteristic of legislation affecting business during the past half century has been its aim, on the one hand, to avoid government ownership or control and on the other hand, to prevent in private industry the formation of trusts, combinations and various types of agreement which would bring centralized control of an industry. That the members of an industry should be permitted to get together for the purpose of stabilizing it, is a concept shocking to general opinion—and not unreasonably in the light of past experience. That stabilization through government control should be thought of at all is even more shocking to industrial opinion in particular. In the face of an integrating technology the government has attempted to preserve primitive forms of competition. But there is an emerging public consciousness of inconsistency between the motives and procedures of productive technology and those of competitive enterprise. There is thinking about it in these days of severe depression as never before; for the logic of technological development is pressing for a solution of the problem of instability on the scale of entire industries.

Notwithstanding basic assumptions, technological development has already had some slight influence in modifying the conditions of blind competition. In one instance this has been quite open, but in most instances indirect and gradual. Legislation governing the organization and operation of railroads is openly a consolidating and stabilizing influence under government regulation. The decisions of the Supreme Court have of late tended toward a more liberal interpretation of the restrictive legislation affecting group conduct. The attorneys general have been co-operative in permitting[27] "uniformity of policy and practice which will be of assistance to business men who desire by co-operative methods to eliminate waste and unfair practices in industry and at the same time keep strictly within the

[27] *Trade Association Activities*, Washington, D. C., U. S. Department of Commerce, 1927, p. 2.