

A brief consideration of these Ordnance Department experiments in organization plan may be worthy of our attention. In its peace time form, the Ordnance Department was departmentalized on a product basis, each department operating almost independently and performing for itself all the functions necessary to carry out its duties. This plan of organization under the stress of war exhibited clearly the weaknesses inherent to its type. There was lack of coordination; there was competition between departments; the exercise of the same function by separate departments produced lack of uniformity in aims, policy, practice, design, progress, etc. There was a waste of trained technical effort and the individual departments failed to receive the benefit of the best talent available anywhere in the organization on their particular problems.

This organization was superseded by a very highly functionalized organization plan. The plan was very boldly and broadly conceived and most admirably worked out in detail. Its failure to give entire satisfaction was very largely due to the fact that there was no time to develop it gradually, nor to educate its personnel in its theory and utilization. It was so advanced a type of functional organization that it was completely outside of the experience of most of the men who had to work with it. Even some of the ranking officers who held key positions entirely misconceived their jobs. There was not time to sell the plan to the personnel.

Perhaps never before had such a beautifully worked out scheme of functional organization been tried; certainly never on such a large scale. It is most unfortunate for the entire science of organization that it did not have a fairer opportunity to demonstrate its merit.

The fact that there are so few completely functionalized organizations in operation in the country, makes it difficult to introduce such a type to personnel which necessarily is totally unfamiliar with it. This fact must be accepted as a disadvantage of such a form. In addition to this, other weaknesses became apparent as characteristic of the type. Such weaknesses can be recognized and safeguarded to some extent, but not completely eliminated.

A completely functionalized organization plan provides too few positions from which a broad view of the organization—its aims, its progress and its accomplishments—can be obtained. It should not be forgotten that an organization is a means to the end and not the end itself. The end of a manufacturing organization is production. But with each of a majority of its members concentrating on a narrow function with little

or no conception of the finished whole, rapid production is apt to suffer; and where the organization is faced with the problem of bringing together a vast number of items from widely distributed sources to be assembled according to a complete program, balanced production is most difficult to attain. Such an organization also is deficient in flexibility and it is very difficult to emphasize or speed up any individual project. A rigid adherence to routine is almost essential to its success. All projects look alike to members of the organization as they take their place in the endless chain of papers moving from desk to desk.

It is a very complicated mechanism depending for success on the perfect working together of all its parts. A failure anywhere stops the whole machine.

The plan discourages initiative on the part of executive officers because all of their suggestions have to go back through the planning department for approval, while the actual planning officers are apt to be so far away from the execution of their plans as to lose the advantage of personal contact.

The scheme of organization certainly produces a ponderous machine capable of turning out a vast volume of production once it is under way. Like most ponderous bodies, however, it is very deliberate in its movements and it is doubtful whether it could be made agile enough to meet the exigencies of a war. This type is best fitted for an industrial organization built to last indefinitely and turning out a large volume of staple goods. It is hardly suitable for an emergency organization hastily thrown together for quick results and expected to be of a temporary character only.

A war organization must be of a type that can operate successfully in an extremely skeletonized form in time of peace and be capable of rapid expansion *ad infinitum* in time of war. A completely functionalized organization is too delicate a mechanism to meet this requirement.

Modifications made in this form of organization by the Ordnance Department previous to the armistice, were admittedly makeshifts attempting to bolster up points at which the organization did not function satisfactorily. Inasmuch as many of these failures were due to the inadequate understanding of the organization, we can learn little by considering these modifications.

After the armistice, however, an entirely new plan of organization was prepared for the Ordnance Department for the use of its peace time organization. This plan was complete and consistent throughout.

As is usually the case, with reaction the pendulum swung to the other extreme, and an organization plan was adopted in which the possibilities of conservatively utilizing functional features of organization were under-developed. Under the Chief of Ordnance, there were established four main divisions of Administration, Engineering, Manufacturing, and Distribution and Maintenance. The manufacturing function was departmentalized along the lines of specialized products. To these manufacturing departments were assigned functions of design, procurement and inspection, which might more properly have been assigned to functional organizations, exercising these functions for the entire Ordnance Department. To this extent the organization very nearly reverted to the original type which existed before the war. The main difference was that the Administration Division acted as a planning department to the extent of formulating the program and checking up the progress of its execution and had a general supervision over the administration and procurement functions of the Manufacturing Division. The Engineering Division had a general supervision on the design and inspection of the Manufacturing Division; while the Field Service Division, which exercised the supply and maintenance functions, performed functions which had been almost entirely neglected before the war. The supervisory functions given to the Administration and Engineering divisions represented an effort to provide a scheme of coordination for the entire department which had not been in existence before the war, and the need for which was painfully apparent when the old organization attempted to handle war duties. To this extent the plan is a vast improvement over the pre-war plan. In my opinion, the plan could have been very much strengthened if the duties of procurement, design and perhaps even inspection were completely functionalized in separate divisions. The plan of assigning these duties to manufacturing sections with supervision from other divisions, even in the early days of the organization, gave indication of producing friction and a lack of definitely assigned responsibility.

These experiences confirmed in my opinion the desirability of occupying the "middle of the road" position between a completely functionalized and a completely specialized or straight-line organization plan. As a general principle, it is believed that a Staff and Line organization, with the Staff organized on functional lines and the Line on specialized lines, is the best adapted to most manufacturing problems. Just where the division between the functionalized Staff

and the specialized Line portion of the organization shall be drawn, is a special problem to work out for each organization, depending on its conditions. In a general way, it is believed that the planning, technical, expert and service functions, applicable alike to all branches of the organization, may all be classed as Staff duties and organized on functional lines; while the operative and production duties of the organization may well be departmentalized on a product basis. With a judicious application of this type of organization, it is believed that the maximum advantages and the minimum disadvantages of each type of organization may be realized.

There was much discussion in some quarters at Washington on the advantages and disadvantages of centralization and decentralization of organized effort.

With a Staff and Line type of organization, this matter readily adjusts itself. In the functionalized staff end of the organization, is centralized the general planning for and direction of the entire organization, while the execution of the plans may be decentralized in the Line end of the organization to any extent found desirable.

The Supply Division of the Ordnance Department, with which I was most intimately associated, was organized on the principle of centralized control and decentralized operation, which worked very successfully. It was the only organization in the War Department that I know of that retained its original form of organization throughout the war. In the early days of the organization, when it was just being formed, and Ordnance supplies were very scarce, the centralized control extended far out into the operating departments. But as the organization became perfected, its personnel became trained, and as supplies became somewhat less limited, the active central control became more and more relaxed and the operating departments more and more free to handle their own local problems in accordance with their own best judgments.

Certain standard principles of policy and method were set up in order that practice might be uniform throughout the division, but inside of these standards, the decentralized departments were given complete freedom of operation. It was only required that sufficient reports of stocks and operations be furnished to enable the central control to maintain a check on conditions and accomplishments and to intelligently formulate general policies. It is believed that the policy carried out by this division is the correct policy. Detail should be decentralized as far as possible and as rap-