

I cite this merely as one example. This condition was true in Europe, as here. Just before the war closed, steps were taken again leading toward concentration of supply control, and I am very glad that the war stopped when it did; otherwise, we would have returned to a condition of unwieldiness.

Whether the selections shall be made chiefly on the basis of product or chiefly on the basis of process, will be determined by that amount of work which will provide for specialized treatment, or by the relative importance of the product or process, or by difficulties in the carrying on of the process or of the handling of the product.

I want to bring this point out, if I can, because it was very instructive in connection with the different ways in which different departments of the war organization handled their affairs. It is this: some recognized at once the magnitude of operations of single lines of product in which, on any line or element of the product, the business activities were greater than known in any industry existing up to that time. There were others who believed that the principles of functionalization, the principles of organization which had been tried out before on limited productive efforts, would apply during the war.

And so we had a peculiar condition in connection with the organization of various branches of the service; one branch organized highly with regard to process, another organized very highly with regard to product, and the other departments organized all the way between, and some of them bound to hit a very happy medium. For instance: in the matter of ordnance production or ordnance supply, taking for example the subject of artillery, it is obvious that the burden which was thrown upon our organization in this country to produce artillery reached that point where it was segregated first, to artillery; secondly, to types; and then functionalized to process; and even then the functionalized organization, based on the element of process, had a tremendous amount of duplication. That segregation as to product, I believe, could have been advantageously carried very much farther than it was before functionalization occurred as to process. This, to me, is one more of the organization lessons of the war, namely: that the unwieldy task should be segregated, so far as possible, into units or elements, the organization for each being all inclusive and containing all necessary process functions, depending on the amount of work which is to be done.

The extreme test of established scientific industrial

principles that occurred through this period has materially strengthened our belief in the correctness of these principles.

Finally may I bring out this conclusion: that the forms of scientific management which have been applied to industrial practices are right, and that the war has not in any sense strained them; that even so large a problem as this can be solved by those practices which we have carried on in industry. And it does seem to me that one of the biggest lessons of the war which we have learned, is that the expansion and further study of the principles of industrial management, promulgated and carried on under the Taylor principles of scientific management, have been justified in practice under one of the heaviest burdens ever placed upon them.

## II

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It is a matter of common knowledge that to place the United States on a war basis required the building up of the most enormous organization ever created in this country. It is not perhaps so generally appreciated how inadequate a nucleus this organization had to start from and how almost universally it had to be created out of the whole cloth.

The Army had some theories on the organization of mobile fighting units. It had no theories at all on the organization of the various services necessary to place this mobile force on the fighting line and keep it there. It was blissfully unconscious of any lack in this direction.

As a result, the sudden expansion from a microscopic army on a peace basis to a huge army on a war basis, threw a tremendous strain on the little undermanned supply bureaus of the Army, and one which they were unprepared to handle. Functions which had been easily taken care of by one or two officers in the piping days of peace suddenly developed the need for a large personnel, and new functions hitherto undreamed of or identified as separate functions, fairly shrieked for attention. There followed a wild orgy of expansion. Every department and sub-department indulged in a scramble for personnel, the main idea appearing to be that if they could only get people enough, they could handle their jobs.

All sorts and conditions of organization sprang up in the various departments, from the purely main-strength, systemless type to the most elaborate and

complicated ones. Organizers and systematizers of all shades of belief flocked into Washington with their advice, and acres upon acres of blueprint paper were neatly blocked off in the typical little squares of organization charts.

Those of us who happened to be in Washington in the spring of 1917 had a most interesting and enlightening experience. Most of the time we were fighting desperately to make some impression on what we conceived to be our own jobs, but in the brief interval when we could get our heads above water to take a fresh breath and look around, fearful and wonderful sights met our eyes.

Much of the organization work we saw was well conceived from the beginning; much was the result of sincere and painful effort on the part of men who were earnestly trying to master a task for which they had, and knew they had, no previous training; some was the self-confident work of men who had no capacity for the work and didn't know it; and some unfortunately was the work of individuals whose equipment consisted of a patter of technical terms, a few standard cards and forms and a typical organization chart.

Time is a sovereign remedy for most troubles and the progress of the war saw the failure and discard of many an unfit organization. Improvement was continuous, but those of us who have labored years with our own little organizations realized that nineteen or twenty months was all too short a time for an organization of a size that the War Department grew to be, to find itself.

Before attempting to draw any lessons from these tremendous experiments in organization, it may be well to note the circumstances under which they were undertaken and the purposes for which the organizations were formed. These differed materially from general commercial circumstances and purposes.

First: The organizations were formed during a period of emergency when everyone was in a state of nervous tension.

Second: With respect to personnel, there was available through patriotic motives a wealth of personnel of the highest type such as no commercial organization could possibly command. There was also most insistently available another large body of personnel not so desirable and of a kind not likely to be found trying to break into a business organization. The situation had its advantages and its disadvantages; it

was certainly very different from any situation in ordinary business experience.

Third: The organizations were created to fill an abnormal need and were of a temporary character which was fully appreciated by their entire personnel.

Fourth: Speed was the prime factor in the situation, with quality second and cost last and entirely subordinate to the other factors. The order of importance of these three factors varies with circumstances in commercial practice, but in no business can cost be so utterly subordinated as it was in our forced draft effort to overcome years of unpreparedness.

Fifth: The dominant specific aims of the unit organizations changed frequently and radically. In war it is the unexpected that happens; the one fixed purpose is to beat the other fellow. The details as to how the beating is to be administered may be turned upside down any minute. There was no time to be wasted in mourning over well-laid plans sent to the scrap heap by an unexplained fiat from higher authority. An organization that could always land on its feet through a series of revolutions was what was required.

Sixth: With respect to politics, the organizations were subject to limitations and interferences in their work to an extent most unusual in business organizations.

It is a safe statement that the many organizations created and developed by the needs of the war, produced no new principles in organization. Their experience simply served to more clearly differentiate between the sound and the unsound principles.

The most important principle that was impressed upon me was that an organization, no matter what the form, must be clearly defined and its mechanism thoroughly understood by its personnel. Every member of the organization should have an unmistakable job, definite responsibility and adequate authority to meet that responsibility. It is essential that the assignment of duties and functions be so carefully made that all of the duties of the organization are covered and nothing goes by default, while on the other hand there is no overlapping of duties between different units of the organization. The mechanism of the organization should be so clearly grasped by all concerned that it can not be possible for any legitimate duty to arise which the organization will be at a loss to understand how to handle.

There were cases of crude and illogical types of organization that ran straight into the face of accepted good practice, which nevertheless functioned pretty