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THE PROCUREMENT ACTIVITIES OF THE GERMAN ARMY PRIOR TO AND
DURING THE WORLD WAR.

by

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I am gratified at the opportunity of being with you today and am appreciative of the honour of being asked to speak briefly to you on the subject of the procurement activities of the German Army prior to and during the World War. To begin with, I beg you to consider the fact that this is my first attempt of speaking before an audience in English. Furthermore, I have to confess that I did not take part in procurement operations during the war as I was on duty with troops all the time. The following is based on studies I made during the recent years in the German War Department

To you of the Industrial College who are the only officers in the world fortunate enough to be able to devote yourselves to a regular study of procurement questions, it is hardly necessary to emphasize the fact that the German ~~economic~~ economic history of the late war can not and does not want to be regarded as a model. In fact, you know that deficiency and growing need were characteristic of the German procurement operations from the very beginning of the war. On the other hand, this situation has produced results which, from the point of view of their technical effects, have laid the foundation or have changed various manufacturing methods entirely. Such results also allowed a country of relatively small size, with its frontiers closed, to permanently secure

the supply not only for its own but also frequently for its allied troops.

I shall endeavour to give you a brief survey of German procurement during the war and to call your attention to what is perhaps of special importance still today even though partially only for the reason to avoid those mistakes in the future which have been made by Germany in the past.

That this main and fundamental mistake, the lack of sufficient economic preparations, has been recognized by your country, is assuredly proved by the institution of your Industrial College and the successful activity of all your supply branches headed by the Planning Branch. In spite of this I must briefly describe the extent or rather the lack of procurement preparations by Germany in 1914 in order to create a basis for the mutual understanding of the following. The organization of the German Army and Navy at that time was not favourable to the uniformity of procurement preparations. Due to history and tradition, it varied considerably from the normal practice in other countries.

There was a Naval Ministry in the Federal Government headed by the Secretary of the Navy, an Admiral. A Secretary of War, however, did not exist in the Federal Government. Each of the greater States (Prussia, Bavaria, Saxony, Wurttemberg) had its own War Minister, in every case being a general officer. He was a member of the respective State Government and in that position responsible to the Parliament. The Prussian War Minister, as by far the most important, was pre-eminent and, whenever necessary, represented the Army in the Federal Government

also.

But the highest and most influential position in the Army was that of the Chief of the Great General Staff. The Great General Staff was not a part of any War Ministry, rather being an authority by itself. Its chief was responsible for the defense of the entire nation and for the war plans, reporting directly to the Supreme War Lord. The necessary resources, however, as manpower, material, money came from the various War Ministries.

From this situation it can be concluded (and there are other reasons also), that as a rule the Great General Staff presented demand while the War Ministry, hampered by political influence and appropriations, often had to diminish its high aspirations. Therefore, it is not astonishing that the suggestion was repeatedly made by the Great General Staff to increase the industrial war preparations-less astonishing that these suggestions were decreased by the War Ministries and the State Governments for lack of funds.

It does not seem necessary to go into further details as to how the Prussian War Ministry, shown on Chart 1, at that time was organized for supply

It is sufficient to say that the various Departments of the Ministry, especially the sections of the General War Department, decided upon the amount and the types of equipment and subsequently gave their orders to the Supply Department (Feldzeugmeisterei) to carry out the procurement, but even this Department had no active procurement organization. In fact, it passed the procurement orders to the respective Arsenal

Inspections which had them carried out by their own arsenals or by certain private firms.

If it seems that decentralized procurement existed to some extent, centralized control was entirely lacking. But also the decentralization of procurement was not systematically organized. Procurement was carried out according to the various using branches, not organized on a basis of material. So, for instance, field and foot artillery had entirely different fire control instruments for the same purposes and also different harness. There was different signal material in all branches. This multiplicity of types proved to be the more confusing since four War Ministries, as mentioned before, were procuring in the same manner. Furthermore, besides the arsenals, quite a number of Chiefs of Branches, especially of technical troops, many other military institutions, and in some cases, the troops themselves were authorized to procure.

This procurement organization, if it deserves that name, very soon proved to be unfit for the requirements of the World War, particularly as it was weakened by the transfer of many officers to duty with troops at mobilization. The war itself, in fact, created soon an organization of its own to which I shall refer later.

No more than the organization could the reserves of munitions themselves be adapted to the needs of a World War lasting for years. The modern principle, that the material mobilization of a country relies upon the preparedness of its entire industry for war, the reserves of finished munitions being a supply only up to the time when industrial preparedness comes

into effect, had not yet been born. By saying this, I do not want to diminish the actual value of those reserves. On the contrary, it is well known what high importance is attributed them by some nations in the Preparatory Commission of the Conference for the Limitation of Armaments at Geneva. In 1914, however, the reserves were almost the sole resource of the material preparation as a whole. Much less value was attributed to the possibility of supplementing these reserves than to keeping the amount in storage as large as possible.

The amount in storage had been computed for the initial equipment and consumption of the regular army and the anticipated reserve units. As the result of the Russia-Japanese War, the amount of ammunition in storage had been largely increased during the years preceding the World War. The amount required by the General Staff, however, had not been attained up to the outbreak of the war. The repeated request of the General Staff that the stored amount of ammunition had to cover the period of time up to the beginning of wartime deliveries had by no means been fulfilled. There were, for instance, 1000 rounds for each piece of the field artillery. The stored amount of rifles and rifle ammunition was large. No reserves, however, existed in machine guns which were considered as a new weapon at that time though several hundred were in process of manufacture. For the field artillery there was ten per cent equipment reserve in store. The foot artillery was to be primarily supplied with such guns as were kept in fortresses which were not attacked. The stored amount of signal material and carriages covered only the essential mobilization requirements.

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The amount in storage although always a compromise between the requirements of the General Staff and the efforts of the War Ministry proved entirely efficient. The German Army took the field in splendid equipment. In a very short time, however, a deficiency of requirements was discovered in two very important directions. The consumption of artillery ammunition surpassed all expectations as much as the number of new units, which, based on hundreds of thousands of volunteers, were formed soon after the outbreak of the war.

The supply was, in wartime also, primarily to be provided by military arsenals (chart). Their production was to cover almost forty per cent of the anticipated requirements. Their mobilization orders provided for the possible increase of production. Also a certain amount of material was permanently kept there in order to start the increased production immediately and to continue it for three months. The arsenals not only met these demands but exceeded the estimates corresponding to the increasing requirements. They could, however, not be utilized to the utmost and were not suitable for instructing private industry since their methods had not kept pace with modern development. Their machines were obsolete and their drawings could not be understood by private firms.

A similar preparation existed for those firms of private industry which in peace time permanently furnished supplies for the army. The best known among them are Krupp and Ehrhardt who manufactured guns. Endeavors to increase the number of these firms were often made during the years just prior to 1914. The leading idea was to restrict the monopolizing

position of some few firms, especially of Krupp, and to prepare a larger number of them for munitions work by educational orders. The relatively small amount of peace time requirements and the high costs of such occasional orders restricted the results of these efforts. Consequently, the number of these plants which manufactured guns and rifles, powder and ammunition, amounted to twenty-five in all in 1914. There were 35,000 at the end of the war. To mention another figure, the production of all military and private plants together amounted to fifteen pieces of field artillery in 1914, that was twenty-five hundredths of one per cent of the initial equipment. In 1916 two thousand field guns were manufactured in one month.

Besides the preparedness as described for the arsenals and for the private munitions industry, the arsenals had made contracts with certain other firms for deliveries of ammunition in case of mobilization. The number of these firms was primarily restricted by the high requirements as to the quality of war material. Also, it was feared that the uniformity of the material would suffer from taking in more firms. Only in the case of field artillery ammunition, the supply of which was highly critical, a special design was prepared suitable for quantity production, the cast iron shell, which in fact helped over the worst time of ammunition shortage in 1914-1915. An inspection of these facilities with regard to their capacity was not carried out in general. Indeed, many of them could not fulfill their obligations at mobilization as their workmen were withdrawn by another military authority and the needed raw material could not be procured in time on account of the utilization of all railroads for the

transportation of troops.

Outside of the army itself there was no industrial or agricultural war preparation of any kind. A plan calling for Governmental subsidies to secure at least the corn supply during the summer months until the coming in of the new crop had been denied by congressional commissions. Agricultural as well as industrial circles could not picture anymore than the military circles to what degree their own active participation in wartime would be necessary. Everyone was convinced that war would necessarily condemn all industry except the ammunitions industry to complete idleness. In fact, to mention a drastic example, the German steel production decreased from one and one half million tons in July 1914 to one half million tons in August 1914.

Regarding this situation, it is hardly necessary to say that neither industry as a whole kept a stock of semi-finished or raw materials to provide replacements to meet possible difficulties in war time nor that the military authorities had any influence or control in that direction. The actual stocks of this kind became known only by an investigation made shortly after the beginning of the war under the direction of the Prussian War Ministry. At that time it was found that the stocks would cover the requirements of normal production for a period varying between three and ten months.

In an actual industrial preparedness for war, it would have been of special importance to have control over such stocks in a country like Germany which depends to a great extent upon the importation of raw material and the coasts of which, short as they are, could easily be blockaded. The production of

industrial raw materials in interior Germany at that time made the country self-supporting only in coal and potash, nearly self-supporting in zinc and lead. The German production, however, of other raw materials of high importance for war supply as iron, manganese, copper ore, oil, saltpetre, rubber, and cotton, to mention a few, was either non-existing or too little to cover even the peace time requirements. Moreover, such raw materials as existed in Germany itself were to be found close to the borders in the East and in the West, and consequently were specially exposed to hostile attacks from the ground or the air. Furthermore, these strategic raw materials, as far as they had to be imported, came from countries whose political pre-war attitude or geographical situation oversea made it improbable that a continuing trade was to be expected in wartime. The indispensable iron ore was, however, a valuable exception as it was imported from Sweden by way of the Baltic Sea which was controlled by the German Navy.

The industrial power in Germany at that time was almost entirely furnished by coal. The high value of brown coal or lignite had not yet been wholly recognized and it had only been made accessible to a small degree. The organization of power in connection with war had never been considered. The transportation facilities, first of all the highly developed railroads, were splendidly prepared for the transport of troops and supplies. The statutory provision, that the entire railroad system would be immediately put under military authority at the outbreak of war proved highly satisfactory. However, the plans, based on previous experience and the assumption of a short war,

made no provision, either to utilize the railroads economically for war industry, especially by choice of the shortest routes for the necessary transports of material, or to keep the railroads themselves in an efficient shape.

In view of this situation, the far-sightedness and the influence of a great man were necessary to show and counteract a dangerous gap in the national preparedness for defense, when in the first days of August 1914 the purely military preparations gave a brilliant test of their efficiency and no link in the chain of mobilization seemed to be lacking. This man arose in the personality of Walter Rathenau, then Chairman of the Board of the General Electric Company, after the war temporarily German Secretary of State and in this position assassinated by fanatics. In the first days of mobilization, Rathenau called on the Prussian Minister of War, then General v. Falkenhain, later on Chief of the Great General Staff, and reported to him his doubts and proposals as to the critical raw material supply of German industry and the danger resulting therefrom for war supplies as well as for the maintenance of the domestic economic life. Perhaps for the first time the problems of an "assurance of adequate provision for the mobilization of material and industrial organizations essential to war time needs" were realized and their solution first attempted. It seems to be of special significance that these problems were for the first time enunciated in this somewhat concrete form by an industrial leader, and of as much significance, that they were directed to a general of the Army who immediately recognized their importance and put into effect the first necessary measures. They consisted in

creating a section for raw materials (Rohstoff-Amtlg), which was attached to the War Ministry under the direction of a civilian, Rathenau himself. His first action was to collect statistical data of the raw material stocks of industry. It should be emphasized that there was no law on which to rely for this purpose. The only governmental regulations with respect to industry issued with the mobilization order, prohibited the export of some of the most important military supplies. It was a voluntary act, that industry furnished these statistical data with the before-mentioned result. This was the very first beginning of a military procurement organization in Germany, which will be discussed in its organization and technical, economic and social operations.

The procurement organization in fact, remained an improvisation until the end of the war. Originating out of hardly anything, as I showed you, its problems grew almost faster than its machinery, and the lack of material, which it sought to remedy, was equal only to the perpetual lack of men available and suitable for this far-reaching duty.

In particular, the following seems worthy of being mentioned.

1. The entire procurement organization, instigated by the action of Walter Rathenau, was under military command, excepting the administration of food and of certain raw materials, such as coal and potash, in which Germany was self-supporting. Consequently, the producer as well as the distributor and the consumer mainly looked upon the military authorities as those who were responsible to the entire nation. Certainly, this solution of the problem was welcomed by the military administration which did not fear the responsibility. And indeed the first measures were only intended to conserve the

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indispensable war material for the use of the only then justified consumer - the fighting forces. Also this solution adapted itself to the German war regulations, since, according to them, all executive power in the interior was held by the military authorities. And for sure, the most necessary steps in this new development were put quicker into effect by the military authorities than could have been expected from a civilian department. Moreover, the military authorities employed all leading industrialists of the country, partially in consulting, partially in active control positions, as Rathenau himself.

However necessary, logical, and efficient it seemed to subordinate procurement under the military organization, nevertheless it must be conceded that this solution had its disadvantages. They increased as the whole nation was drawn more and more into the struggle and consequently the entire industry of the nation more or less was put under military control. In spite of civilian experts, mistakes were made in procuring supplies under this military control, which resulted in material advantages to certain civilian interests at the expense of others. It is contrary also to the general feeling of justice that the principal consumer of an article at the same time decides as to its entire distribution. From a psychological point of view it assuredly is a heavy strain upon the supreme military authorities to be charged not only with the responsibility for the actual conduct of war, but for procurement also. Confidence lost on this side is also immediately a loss on the other. It therefore seems better to avoid the appearance even of a military economic dictatorship. It is preferable to divide the burden of responsibility and to claim only that part of industry for military authority which, based on previously completed plans, is necessary for the actual war supply.

2. The procurement organization was attached to the Prussian War Ministry. It extended, after arrangements with the different states, over the area of the empire and the occupied zones beyond the frontiers.

The peace time organization was herewith upheld. The General Staff conducted the war in the field. So doing, it gained many areas, which in their mineral resources greatly helped the war supply, as for instance the ore basin of Longwy-Briey in France, the copper mines of Bor in Serbia, the Roumanian oil fields. It must be said, however,

that the occupation of those areas was not undertaken for the special purpose of increasing the war supply certainly as might have been done. On the other hand, the General Staff demanded an ever increasing amount of munitions from the War Ministry and therefore urged it to utilize all resources and to attain results which seemed beyond the capacity of the country in the estimation of the War Ministry. And yet in another way the military command in the field supported the industrial operations, namely, by the careful control of an economical consumption of all material and by the collection of captured as well as used material (as cases, ammunition baskets, etc.)

Only the zones under direction of the Navy and the Marine Corps were excepted from the general commandeering of material. This certainly was a mistake which could not, however, be remedied until the autumn of 1918 when the situation was most critical.

From 1916 on the most important branches of the procurement organization were combined in the so-called "Kriegsamt" - Supply Department, the first Chief of which was General Groener at the present time German Secretary of Army and Navy. This Supply Department was expanded to a large procurement organization which was composed of the four elements of procurement, as shown on Chart 2. Raw Materials in the Raw Material Division, Facilities in the Munitions Division, Manpower in the Recruiting and Labor Division, and finally several Price Control and Contract Sections, incorporated in the Munitions Division. An Advisory Board of Industrialists was attached to the Department.

From the point of view of organization the Raw Material and the Munitions Division deserve special comment.

3. The administration of the Raw Material Division was first extended only to some specially important, that is indispensable raw materials, not to be found in the country and the stocks of which were very small. The practice of control, first administered by the Division consisted in prohibiting any export without special permit and any other use than for military purpose. Besides that the department did its best to increase the import and stocks of these materials.

With the duration of the war the number of strategic raw materials constantly increased resulting in a corresponding increase in the number of subdivisions of the Raw Material Division. Also the control measures had to become more severe. It be-

came necessary to compute requirements each month, to examine them and to give special orders concerning methods of procuring them. In order to accomplish this, the methods, still recognized today, were to divert first the non-military, later on also the military, requirements to less rare material or substitutes, to restrict the consumption, to increase the production in the interior and in the zones of occupation, to initiate and to support scientific research work. The mobilization of private property, as church bells, house and kitchen utensils, finally adopted by the Department, proved to be very successful, but it should always be regarded as a last resort.

Beside the Raw Material Division and corresponding to its subdivisions, each commandeering a certain material, a great number of so-called War Companies (Kriegsgesellschaften) were founded. It was their task to assemble and store the material as far as it was not in private hands, to distribute it to the authorized consumers and to perform the settlement of accounts connected therewith. They were companies, incorporated as civilian concerns, which represented the producers of the respective raw material and which were controlled in their business by a commissioner of the Raw Material Department, who generally was an Army officer. These companies were, to some extent, examples of an organized economy conducted by the government, but abusing its authority, they often served to promote the capitalistic interests of some individuals. This fact, in connection with an extensive centralization -- nearly all these companies had their headquarters in Berlin -- and the other fact that the interests of the legitimate trade as well as of the consumers were seldom represented, aroused at length great indignation. The war companies became, from the point of view of the population and to a great extent in reality, the source and places of cultivation of war profiteers. It must be conceded that the actual trade of raw materials could not also be performed by the military authorities, that is by governmental employees or officers, as was demanded by some at that time, even with an additional demand to assemble all stocks at certain depots to be operated by the government. A far-sighted industrial preparation, however, will be able to get along without such companies or at least limit the number of new organizations and rather make use of the existing peace time trade organizations as far as possible.

CHART III.

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The Munitions Division had gradually developed from the "Feldzeugmeisterei". The last impulse to its foundation was given by the so-called "Hindenburg Program", which demanded a tremendous increase in the production of munitions and for the

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first time gave definite figures as to the amount of requirements. Hindenburg in 1916 categorically presented demands for double the amount of ammunition and tripled the requirements of artillery and machine guns. Up to that time the request had been only for "as much as possible".

That the arsenals were not able to fulfill their procurement duties in addition to their increased manufacturing service had become evident early in 1914. The "Feldzeugmeister" itself had to take charge of procurement. At the same time the number and the activity of all the other military agencies involved in procurement was increased. It is hardly necessary to say more about the procedure of procurement of those early months which was characterized by competition between the procurement branches, by lack of knowledge of capable firms and by outbidding in prices. The orders were given to industry and trade wherever they offered their services. Verbal contracts were the rule. It was the same development which all the countries participating in the war had to undergo.

The organization of the Munitions Division meant an important improvement. To put the entire procurement under centralized control was, however, not attained successfully even until the end of the war. The Munitions Division was rather a supply branch, which, as Chart III shows, has a striking resemblance to the U. S. Ordnance Department in the field of its duties as well as in its organization.

Among the improvements, the creation of the Technical Staff deserves to be particularly emphasized. This Staff, under the direction of a civilian Chief Engineer, could finally make the attempt to introduce the principles of quantity production in the procurement of munitions. At the same time, it became an important advisory board for private firms first starting to manufacture war material. Also the problems of procurement of industrial power as well as of machines and tools, up till then neglected, came under the centralized control of the Technical Staff. For the procurement of machinery, boards were created throughout the country which were authorized to expropriate machinery and to assign it to other places where it was needed. Their activity extended also to machinery in the zones of occupation which under strict observation of international obligations was transported to interior Germany. To start work in the foreign plants themselves had proved in most cases far less efficient. The centralization of inspection in the Munitions Division Field Service was of similar importance, as the inspection up to that time had caused many difficul-

ties and delays in production either by narrow minded interpretation of the regulations or by unreliable and untrained persons.

On the other hand, there were many complaints that the sharp centralization of procurement as carried on by the Munitions Division had often caused an unjust distribution of the load or the profit to manufacturers throughout the country, that ignorance of local conditions had often hampered the full utilization of production facilities and that it had led to much unnecessary transportation. The result of a scientific investigation made after the war sets up the correct principle that there ought to be one directing authority in procurement which should however have only the control. The distribution of the orders themselves ought to be performed rather by "Sub-Central Sections" as they called them, spread throughout the country. This proposal corresponds in a striking manner to the present procurement organization of the United States Army

If the war time procurement organization gradually disappeared after the war in favour of free economy, its scientific technical results exist in Germany to this day. It would lead us too far if I should specify all the substitutes in use in Germany during the war. The success of the German war economy or rather war science on this topic is known all over the world! Let me just mention some few facts

The first and most important result of this kind was the creation of the facilities for extracting nitrogen from the air. The Haber-Bosch System, still today in use in the German chemical industry, was near to perfection at the beginning of the war. The first facilities for mass production, however, were created as a consequence of the war because only in that way the German manufacture of powder could be safeguarded beyond the Spring of 1915, at which time the small stocks of Chile saltpetre would have been consumed. Today Germany is exporting several

hundred thousands of tons of this artificial saltpetre annually.

Lack of copper led to the foundation of the aluminum industry, which, although based on foreign raw materials, represents a very important factor in the German economy of today with an annual production of almost 30,000 tons.

The lack of oil had highly important influence on the use of benzol, which is recognized in Germany today as the most valuable fuel and of which more than 300,000 tons a year are extracted. At the same time the first experiments for the liquefaction of coal were attempted. The use of alcohol as fuel became almost as important for Germany as that of benzol and is still kept up with good results. Finally, the application of medium and heavy oils and thereby the use of the Diesel motor were especially promoted by the needs of the war.

A somewhat less perfect substitute, which, however, was very important for Germany at that time, was the artificially made rubber. Experiments to the end of its material improvement as well as to decrease the costs of manufacturing have never stopped since the war. It was recently reported that artificial rubber has proved fit for pneumatic tires while it was formerly restricted to solid ones.

In contrast with these outstanding results in raw materials, the experiments performed to simplify the manufacturing methods seem to be of less interest since it is in your country that these experiments have been advanced so astonishingly after the war. The fundamental principles have already been discussed in describing the organization of the Munitions Division especially of its Technical Staff. The trend to standardization

and simplification, today as alive in Germany as over here,
originated in Germany from this military authority.

Finally, the needs of war have repeatedly caused the opening of new or the enlarging of already existing mines, which have proved to be valuable also under post-war conditions.

Together with the technical problems, quite a number of important economic problems grew up, for which at first no experienced personnel was available in the military departments. There was no lack of money which was raised from interior loans, but an effective use thereof was often lacking.

Besides the before-mentioned multiplicity of agencies engaged in procurement, this defect primarily became evident in formulating contracts. The simple peace time procedure of price control, based on the manufacturing experiences of the arsenals could not be applied to the quantity production of war time. This mass production especially felt the lack of security of peace time orders with regard to their continuity and duration. The idea of a short war prevailed in the beginning. Later on a clause was added to many contracts with regard to demobilization, which contributed to a great extent to the fact that the industry demanded and received large premiums for the risk involved. This, in connection with the general need of all materials, resulted in a tremendous and ever increasing rise of prices. Furthermore, the government suffered great losses by spending or contributing money for new industrial buildings, for the investigation and opening of mines, or for scientific research work, this money often being given without further obligations from the recipients.

A favourable change also in this field was accomplished

at last by the creation of the Munitions Division. Three sub-sections of this Division had to control all procurement contracts, which as a principle were to be based on the price of one piece of each article these were a Central Judge Advocate's Section, an Economic Control Section (both in the Administrative Section) and a Technical Control Section, incorporated in the Technical Staff. In a similar way the new buildings, to which the Government contributed, were supervised.

The participation of the distributing industry in the great process of war time procurement went through a rather interesting development. At first the trade representatives were highly welcome to the procurement authorities, since they often disposed of stocks immediately available and since they had such knowledge of firms as was lacking to the procurement officials. Gradually, however, this system was abused by commission agents. Yielding to the protests of regular industry, the procurement authorities finally attempted to end the disorder and arrived at the other extreme, of eliminating the middleman entirely and of restricting business to the firms themselves. But this procedure also was recognized as a failure, since industry used the elimination of the middleman and therewith of a great part of competition to further increase prices. Moreover, trade could not be eliminated in many cases as for instance in assembled articles. So at the end, honest trade proved to be an indispensable link in procurement.

As to export and import, the already mentioned export prohibiting, issued with mobilization, were partially abrogated shortly thereafter. For iron and steel, for instance, the reasons

were the small amount of their domestic requirements during the first months of the war, which forced the iron industry to go into the foreign markets in order to maintain its existence. Also, the necessity of procuring foreign money as well as other political and economic reasons forced the continuation of export to neutral states. Exportation, however, remained under permanent control of the Government. A firm, which exported finished articles containing rare metals, was obliged to import the same amount. Articles, especially chemicals, in which Germany held a world monopoly, were authorized for export only to such an amount as corresponded to the pre-war buying of the respective country. A special supervision as to the destination of these goods was to prevent the export from neutral to hostile countries. The export to allied countries became more and more an important factor. As to import, an interesting attempt was made by the war ministry in 1915 to restrict the import of iron ore from Sweden in order to eliminate the influence of this high priced ore on the prices of domestic iron ore. It is remarkable that this attempt, although it was not carried through on account of growing requirements, resulted in a large increase of the national production of iron ore.

Labor was one of the most difficult problems all through the war. According to the German peace time opinion, every able-bodied man had to do duty with troops on the front line. Exemptions for the munitions industry, therefore, had taken place only to a very small extent. Even the arsenals at mobilization had to dismiss a large part of their best workmen for duty with troops. In spite of this, there was at first no numerical lack of labor since many industries had to restrict or to close down their plants

Also, the suspension of certain restrictions imposed by labor laws as, for instance, with regard to working hours, employment of women and minors, proved to be very useful. Beginning in autumn 1914, women took over a great part of the work of the country. Later on their number amounted to four millions of which fifty-five per cent were occupied in the electrical, twenty-three per cent in the chemical, nineteen per cent in the metal and machine industry. In agricultural work women were the backbone. The labor unions for their part contributed to the improvement of the situation by resolving not to pay any strike bounties.

On the other hand, the lack of engineers and skilled workmen proved to be so great that it could be remedied only by ordering back men out of the front line. Herewith a new difficult and tedious task arose for the military authorities. Industrialists often accepted large orders and after signing the contract, demanded the return of a large number of their skilled workmen in order to fulfill the contract. The procurement authorities attempted the reverse procedure to issue an order only if the manufacturer agreed to get along without a new demand of labor, but they did not succeed. Finally, also, on this line of procurement the only remedy was to organize from the very bottom. Industry was required and helped to create schools for the education of skilled workmen.

Many disagreements developed in connection with the return of laborers from the front lines. The soldier was temporarily dismissed from active service and got a leave for work at a certain working place. The employer wanted to regard this leave as applicable only to his own firm and from this point of view

often attempted to make work compulsory at his place. Often the employer put these workmen to an alternative decision of working at his plant or of being reported by him as free for duty with troops. The employee wanted to conserve his right of free labor and was often supported therein by other employers who tried to take away from each other the best skilled workmen. The military authorities did their utmost to keep these laborers at the place first designated to them, for instance, by supervision of public employment bureaus and newspaper advertisements, but they always declined to lend their aid to any compulsory labor not expecting any results therefrom.

Contemporary with the Hindenburg Program, a far reaching new regulation was attempted by the General Service Law (Hilfsdienst-Gesetz), which, following the example of other countries, was to increase the amount of labor by a certain obligation of the entire able-bodied manpower. According to this law, every male German from his seventeenth to sixtieth year was obliged to render patriotic service of some kind if not in the front line then at home. Every activity, which directly or indirectly served to support the conduct of war, was considered as service of this kind.

The opinion as to the effect of this law is up to this day still divided. Many believe that a moral appeal to work - and it was only a moral appeal - was not sufficient in the then weakened condition of Germany. Many believe that more severe compulsory measures would have resulted in a wide-spread indignation of the workmen and consequently in a decrease of efficiency. At any rate, the law did not succeed in its provision for preventing workmen from changing their working places. This provision pro-

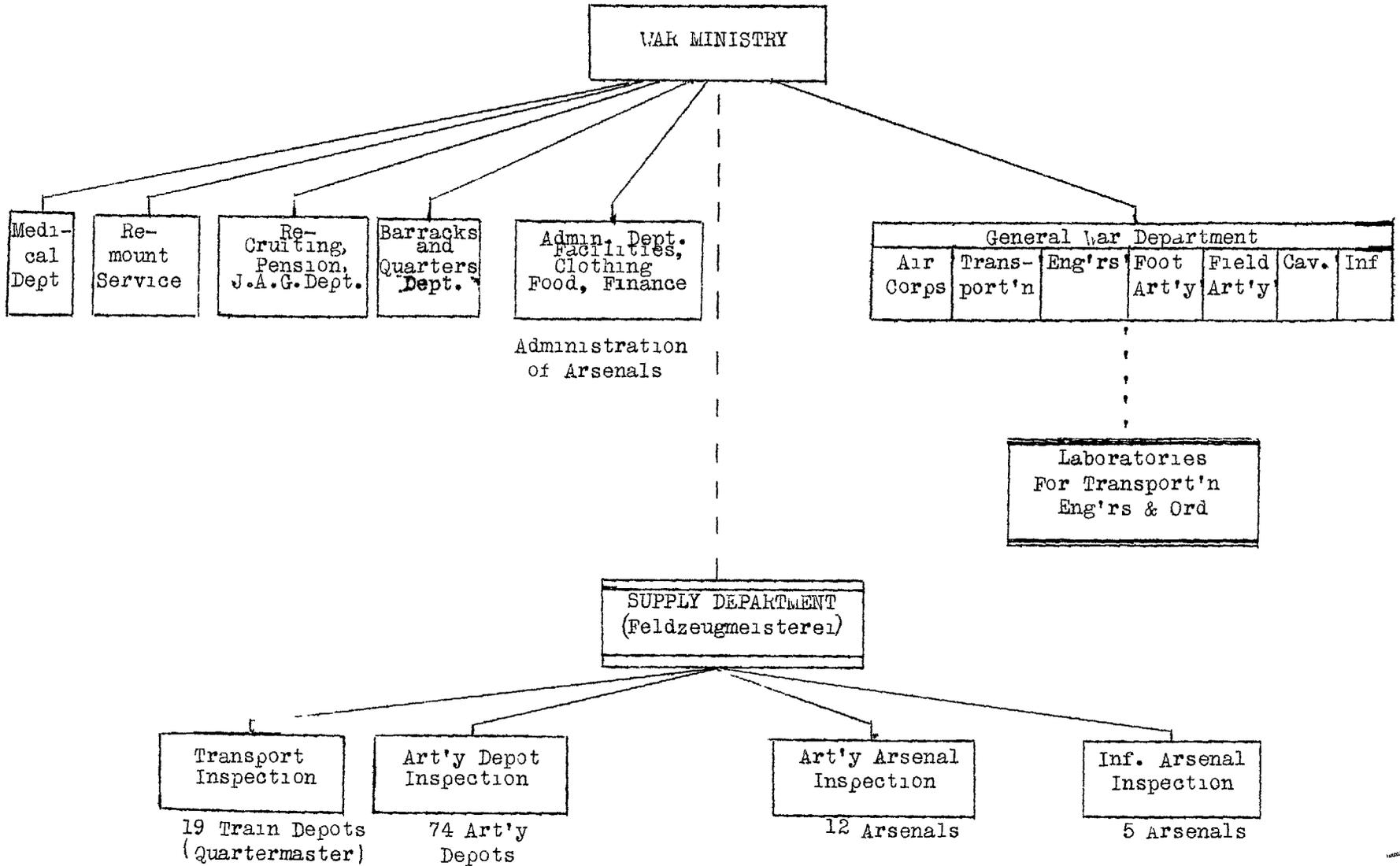
hibited any workman from being employed at a new place until two weeks had elapsed after leaving his former one. Since wages were very high, this provision was mostly looked upon as a chance for recreation.

It is a fact that in spite of this law, the amount of those recalled increased from six hundred thousand to two and a half millions in order to meet the Hindenburg Program. Out of a total amount of eight and a half million able-bodied men, that meant a tremendous figure and consequently led to repeated attempts to send back a part of these men to the front lines, especially the younger ones, as soon as they reached the military age.

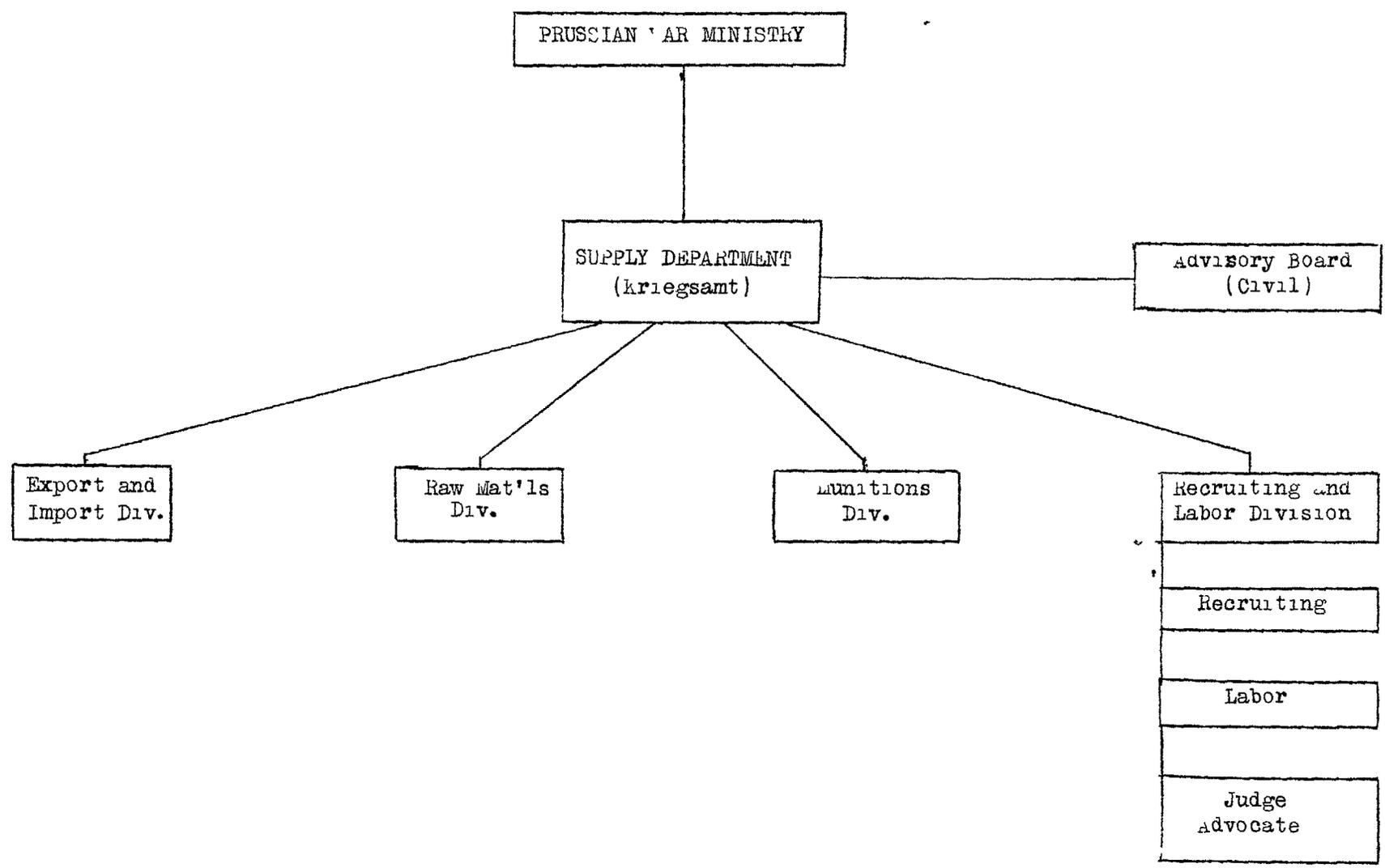
The continual exchange of manpower between front line and industry was one of the causes for many attempts brought about by the simultaneous pressure of food conditions in Germany to bring into accord the high wages of labor with the small pay of soldiers. A solution of this problem could not be reached.

Gentlemen, with this consideration of the labor problem, I have come to the end of my description of the German procurement activities during the war. I have endeavored to demonstrate the principles and therefore have mentioned only a few figures. But, based on existing figures, permit me, at the end, to answer a question often asked. It was not a lack of material which caused Germany to lay down her arms in the autumn of 1918. Consequently, it may be stated that the German procurement agencies as well as German industry, in spite of enforced reliance on their own limited resources, in the end successfully met the strain of more than four years of war.

ORGANIZATION OF THE PRUSSIAN WAR MINISTRY, 1914



ORGANIZATION OF THE SUPPLY DEPARTMENT, 1917



ORGANIZATION OF THE MUNITIONS DIVISION, 1917

