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THE NEW INDUSTRIAL REVOLUTION

WALTER MEAKIN

THE NEW
INDUSTRIAL REVOLUTION

A STUDY
FOR THE GENERAL READER

RATIONALISATION AND POST-WAR
TENDENCIES OF
CAPITALISM AND LABOUR

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PREFACE

The suggestion that nothing less than a new industrial revolution is involved in the process of "rationalisation" may appear to be so sweeping as to need justification. This will be found in the following pages, wherein it is shown that, contrary to a widespread belief in this country, the word is not an unintelligible term used merely to describe old industrial devices such as combines, cartels, and trusts.

It is certainly not capable of simple definition, but the reader of this book will not deny, unless he is hopelessly prejudiced, that rationalisation implies fundamental changes in the structure, control, and purpose of the industries to which the process can be completely applied.

Nor is rationalisation a theoretical conception. It is used to indicate a practical plan for the reconstruction of industry, which has already been carried into effect with astonishing energy in Germany, and to which the rapid recovery of that country from the post-inflation crisis is mainly attributable.

More and more it is coming to be a theme of discussion in every important manufacturing country especially where the staple industries are depressed, either because production costs are too high or productive capacity is in excess of present demand. It is impossible to survey the international economic situation without being convinced that what has been

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accomplished in Germany will be attempted in every country where similar industrial problems have to be faced.

In the following pages there is available for British readers the first effort to explain broadly but comprehensively, and with the least possible use of technical terms, the scope and purpose of the German reorganisation, the methods employed, and the results achieved in the three years of intensive rationalisation which began in 1925. The situation in the depressed industries of Great Britain is examined in the light of these events in Germany. The issues of policy affecting the attitude of both employers and labour in this country to rationalisation are fully discussed. Attention is drawn particularly to the problem of safeguarding the interests of the community as a whole, and, finally, an attempt is made to indicate the direction of the forces and tendencies which are shaping the "new industrial revolution."

It appears to the author to be difficult, if not impossible, to resist the conclusion that the changes now taking place in industry and capitalist organisation and control in Europe will be at least as comprehensive and far-reaching in their effects—although widely different in character—as those which followed the rise of the steam-power factory system.

Rationalisation, beginning as a process of national control and regulation of whole industries, and possibly intensifying in its first stage the struggle for markets between the national industries, will gradually extend its sway to the international sphere. In emphasising the importance of the subject, and in urging that the closest study should be made of rationalisation

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efforts in every country, the permanent committee of the World Economic Conference of the League of Nations has been quick to realise the potency of the new ideas and conceptions of industrial and commercial organisation which have developed from Germany's desperate effort to restore her economic life.

May 1928

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IN the following pages it has been necessary to use constantly what a *Manchester Guardian* writer has described as "a new word, made in Germany, which the stylists proclaim to be an abomination." If apology were needed, it would be offered on the ground that, however forbidding the word "rationalisation" may be, an effort to understand fully the nature and scope of the industrial reorganisation implied by it is one of the most important and urgently necessary tasks for all who are concerned about the future of the depressed industries of Great Britain.

The writer just quoted expressed the opinion that, even if it be a linguistic outrage to speak of the rationalisation of industry, it seems to be almost an economic necessity. "Nobody has yet succeeded," he added, "in saying shortly what it means, but that it means something of importance is not open to doubt." No attempt is made by the present writer to give a short definition. It will be seen from what follows that the efforts already made have for the most part served merely to darken counsel. It is questionable if any word of recent coinage, relating to industrial and economic affairs, has created so much confusion of thought or provoked so many diverse and contradictory interpretations.

What has been attempted in this book is an explanation, in which technical detail is avoided as far as possible, of the German industrial reconstruction which

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the word was coined to indicate. The methods adopted and the results achieved up to the spring of 1928 are described and examined, particularly in their relation to the most pressing of British industrial problems. The wider ideas which have been subsequently associated with the word are also discussed broadly, and an endeavour has been made to indicate the immense importance of the effects of this new industrial revolution on labour policy.

Much more will be heard of rationalisation in all industrial countries during the next two or three years, and, if the full significance of the ideas associated with the word is to be comprehended, it is necessary that the origin and evolution of the process shall be clearly understood. How essential is the need for clarification is quickly shown by consideration of a few typical "definitions," or expressions of opinion, taken from recent discussions on the subject.

Professor D. H. Macgregor, of the University of Oxford, who has associated with the word some interesting theoretical ideas about the "rational" government of industry, defines rationalisation as "the right organisation of industry considered as a type of government, the producers being so related as to enable such policies to be applied as works specialisation, non-destructive elimination of the weak, and the control over the entrance of new establishments."

The *Manchester Guardian* writer already referred to suggests that "in general it seems to denote the widest possible application of scientific method to industrial organisation, and thus leads directly, among other things, to the idea of vertical combination in industry, by which all the intermediate processes of manufacture

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and distribution are united under single control and consciously directed towards a common end."

Professor T. E. Gregory, Professor of Banking in the University of London, dismisses the word somewhat contemptuously as "the new-fangled phrase to describe the old-fashioned device of eliminating competition."

Sir Josiah Stamp, in a recent article on rationalisation in Great Britain, discusses the subject almost entirely in terms of amalgamations and price-fixing. In a note on the nature of the Armstrong-Vickers fusion, for instance, he writes: "It does indicate, however, a different kind of amalgamation, viz. the separation of those which are functionally different, and the joining, or rationalisation, of those that are really most alike in their activities"—the apparent implication here being that the union of concerns is rationalisation.

Sir Gilbert Vyle, President of the Association of British Chambers of Commerce, speaking at a meeting of this body, suggested that it might be well if they clearly understood what was meant by rationalisation, of which they had lately heard a good deal. As far as he understood, it was the conduct of an industry in such a way that the price of its products was fixed, and by the aid of whole or partial monopoly the agreed selling-price was maintained without relation to costs of production. The condition essential to successful rationalisation was the absence of competition, and, as all of them were consumers, it was proper to inquire whether such a method of systematising industries was a good thing for the community as a whole.

As will be shown in this book, it would hardly be possible for a definition to go wider of the mark.

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A writer in the Communist *Labour Monthly*, shrewdly ignoring the fact that the directors of the Russian State industrial trusts are doing their best to rationalise production in the Soviet Union, applied a characteristic definition. While the word was new, he suggested, the "phenomenon itself is of ancient lineage. Rationalisation in its broader sense means a redistribution of the total profits of capitalist society in favour of those sections carrying out the process of rationalisation. Rationalisation in its narrower sense means an increase in the rate of surplus value, and a decrease in the workers' share of the product."

The International Federation of Trade Unions, from which body one would have expected a wider comprehension of the subject, expressed the following view in a report on rationalisation in 1927: "It is not always clearly understood what is the precise difference between the Taylor system and rationalisation. We may explain that instead of the stop-watch—that is, the individual control of Taylor—we have the moving assembly line and the automatic control; while, instead of the Taylor premium, we have a kind of group piecework. But if we do so we are perhaps being a little less clear than if we had simply said that rationalisation is one link more in the chain of difficulties that began with the introduction of the machine."

This view that rationalisation is merely a development of the systems of "scientific management" which have developed from the American "Taylorism" is a common one. It is also understood by some in the limited sense of the elimination of waste, and standardisation. This may be undertaken by individual firms

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within the framework of an industry in which the fiercest internal competitive war may be waged, and which may, indeed, intensify that competition by improving the efficiency of particular works.

German attempts at definition, while more consistent, as one would expect in view of the extensive practical experience of the process in that country, are not much more successful in conveying an adequate idea of what is actually involved in the rationalisation of an industry.

The following declaration of the German Federation of Industries was made in 1925 : " We understand by rationalisation the rational employment of all technical and organisation means in order to increase to the highest degree possible the productivity of the workers. It must be the effort of all who take part in the production of commodities, through the employment of these means, to improve, increase, and cheapen production."

As will be seen in a later chapter, the German Federation of Trade Unions, while accepting this as a broad definition of technical rationalisation, extended the aims to cover a general expansion of trade and consumption, and an improvement in the standard of life of the workers.

The Reichskuratorium für Wirtschaftlichkeit (National Economic Advisory Board), an institution set up and supported by the State to study rationalisation in all its forms, and to promote the application of the process throughout industry, has published the following definition : " Rationalisation is the employment of all means of technique and ordered plans which serve to elevate the whole of industry, and to increase production, lower its costs, and improve its quality."

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Rationalisation, as comprehended by a Ruhr mine director, "aims solely at the increase of productivity and profitability by the reduction of working costs, with prices remaining at the same level, or actually falling."

Finally, we may note a careful and comprehensive definition embodied in the general statement on rationalisation published by the World Economic Conference, held in association with the League of Nations at Geneva in May 1927 :

Rationalisation is understood as "the methods of technique and organisation designed to secure the minimum waste of either effort or material. It includes the scientific organisation of labour, standardisation both of material and products, simplification of processes, and improvements in the system of transport and marketing."

The diversity of opposing views expressed in all these definitions is a sufficient justification for an objective study of rationalisation in the only way by which it is possible to realise fully all that is implied by the term—that is, by showing how it has been applied in practice and the results which have been actually obtained.

Definite rationalisation measures were first thought out and adopted as part of an organised plan of reconstruction in the basic industries of Germany after the inflation period and the French occupation. As in other European countries, these industries were enduring severe depression, attributable mainly to surplus

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productive capacity in relation to diminished consumption capacity due to war causes—accentuated in Germany by the destruction of liquid capital during the inflation period, and by the suspension of manufacturing activity to a serious extent in the Ruhr while the French troops were occupying that region.

Production was already “rationed” among the various works in each industry, under the quota schemes of the re-established syndicates and cartels, when the new reconstruction measures were devised. As the process which is described in succeeding chapters came gradually to be known as *Rationalisierung*, from which the English word is translated, it was, therefore specifically associated in the minds of the Ruhr industrialists with this “rationing” of production.

The first measures were adopted in fact, as a means of achieving a substantial reduction in production costs while regulating output on a scale much below the maximum production capacity. Under a normal system of short time working, and the maintenance of full overhead charges in all the productive establishments, which have to be set against the reduced output, the “oncost” per unit of output is inevitably increased, and the ability to avoid losses without raising prices is proportionately affected.

Rationalisierung was the term used to signify the reconstructive measures by which an attempt was made to achieve a directly opposite result—that is, continued rationing of output to keep it within the limits of current market demands, and a simultaneous reduction in costs. The relationship of the process to “rational” or reasonable methods came at a later stage in the evolution of the process. This expansion of the idea was a natural

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one, and it could easily be argued that when production tends to exceed demand it is perfectly rational to regulate output by rationing. It is also a common experience that a new word or phrase should in time come to be invested with a wider meaning or significance than that which was in the mind of the person who coined it. Ideas expand and develop by discussion.

It is necessary to point out here, however, that some of the theories now associated with rationalisation go far beyond the technical and organisation achievements which the word specifically indicated at the time of its origin. The present study is primarily concerned with these achievements rather than with the later growth of wider economic and industrial theories. The aim of the writer is to describe, as simply and dispassionately as is possible in dealing with a complicated, highly technical, and controversial subject, the incessant constructive effort to survive a crisis of unprecedented severity in these German heavy industries, and to show how closely the effort concerns both employers and workers in the British industries, who are not only in serious difficulty, but confronted with the vastly increased competitive power of the rationalised German industries.

For this reason attention is directed rather to the German reorganisation than to the changes which have taken place in American industry since the war. Although these changes are often described as rationalisation they differ, for the most part, very widely in character and scope from what has been accomplished in Germany, and they do not affect the competitive position of British industry to anything like the same extent. The circumstances which facilitated such a comprehensive reconstruction in so short a time in Germany

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are compared with the conditions in Great Britain.

To understand rationalisation as the process presents itself to the minds of the industrialists and technical men who have built up the new industrial structure in Germany, one must think primarily, not of self-contained establishments, but in terms of a whole industry, whether organised as a trust or on a co-operative basis, or nationalised. It is inaccurate and misleading to suggest that rationalisation is merely an alternative policy to nationalisation. It is not necessary to trustify an industry to rationalise it, nor is it necessary to eliminate completely all forms of competition, or to destroy altogether the management and administrative autonomy of particular undertakings.

What is essential is that the kind of competition which leads to destructive price-cutting shall give place to mutual agreement on a common production and sales policy. This may be achieved, either by complete or partial unification—whether under private enterprise or State ownership—or by the closest possible co-operation of all the concerns in an industry. On no other basis is it possible to proceed to the successful application of the technical reconstruction process implied by rationalisation.

In Great Britain this preliminary stage has been reached only in the chemical industry, where the method of trustification has been adopted as the quickest and most effective. In the coal, iron and steel, and textile industries, which offer scope for the richest harvest of beneficial results, progress in this essential initial stage is retarded by the reluctance of the separate concerns either to form larger units by fusion, or to co-operate with each other as effectively as the German

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industrialists had done long before the war. While this state of affairs continues there may be reorganisation of particular undertakings, with a great improvement in efficiency and competitive power, but there can be no rationalisation.

It is possible to have trustification, or the formation of cartels, or even nationalisation, without the transformation of the industries which is accomplished by rationalisation. This is determined solely by policy. A trust could be established in certain conditions with monopoly power over a market. It could restrict output without considerations of production charges, and pass on all the cost of waste and inefficiency in its monopoly prices. A cartel, exercising price-fixing as well as output control functions, could adopt the same policy. A nationalised industry might be run with a similar disregard of efficiency or cost.

It is clear, therefore, that the technical process may and should be studied, apart altogether from consideration of the merits of any particular form of ownership and control of industry. The need for such an objective study cannot be over-emphasised if the importance of specific measures of output regulation and technical reorganisation as the next stage of industrial evolution is not to be obscured by controversial discussions on wider issues.

An essential condition for full rationalisation is the organisation of a whole industry, either by unification or co-operation, so that a common policy can be adopted by all engaged in it. Output is regulated with sufficient elasticity to meet fluctuations of demand without delay, so that price levels may be kept stable. This is in direct opposition to a price ring policy of restricting

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output to maintain high prices, without regard to potential demand if cheaper goods were available.

Within this system of regulation, low production costs are aimed at by concentrating production in the most suitable works to reduce short-time working to the lowest possible limit ; by the prevention of waste, either of material, labour, or mechanical energy ; by closing down inefficient or unremunerative works or departments, with due regard to the maintenance of reserve plant to meet a sudden rise in demand ; and by the extension of the most efficient works where necessary, and the installation of the best cost-saving plant available at all the works kept in production.

These modernised and concentrated works are not only operated as near to full time capacity as is possible, but the most complete specialisation attainable is secured by the allocation of particular products to the works best adapted for the purpose, and most favourably situated for distribution and the saving of transport costs. This specialisation does not necessarily involve the mass production of goods of relatively poor quality, which may not be a desirable trade policy in any particular country, and it is consistent with the manufacture of goods of the highest quality. Additional savings are also possible by the central control of the interchange of raw materials and semi-finished products between the different works, in such a manner as to cut out all unnecessary transport which is involved when individual works are self-contained, and by the centralised control of sales, to reduce intermediate services to an indispensable minimum.

This full programme of reconstruction was first carried out in the heavy industries in Germany, but it

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has been adapted to the varying conditions of many other industries, and attention is now concentrated on the extension of the principles of the process to transport and agriculture, and to the sphere of wholesale and retail trade. The keen interest with which the subject is being studied is manifest from the incessant discussions in all kinds of industrial and technical organisations, in both the technical and general Press, and at shareholders' meetings, where the results of rationalisation efforts are reported on as one of the most important matters for consideration.

In Germany, therefore, rationalisation is not a theory to be argued about as a subject for economic dialectics. Under the stress of an almost catastrophic crisis, it was planned as a practical policy to be applied with immense energy. It was inevitable that mistakes and miscalculations should be made, but experience determined the course of each successive development. It is now possible to appraise the first results, always keeping in mind the magnitude of the difficulties created by the inflation and the occupation of the Ruhr. Regarded from this point of view, the speed of the recovery from the conditions of 1924 can be justly described as an astonishing achievement.

The following detailed examination of what has been done in the German basic industries shows clearly that rationalisation demands the fullest exercise of the spirit of co-operation, the pooling of technical and scientific knowledge and the fruits of research, and the subordination to the general interest of what might appear to be immediate advantages for a particular undertaking to be gained by holding aloof from the general movement.

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To the pre-war growth of German industry along co-operative lines through the evolution of the cartel system is attributable the swiftness of the reorganisation. There was no parallel in the later rise and progress of this industry to the intense individualism, sturdy independence, and secretiveness which contributed both to the pioneer success and the disregard of social consequences during the English industrial revolution in the first half of the nineteenth century.

The influence of past methods is still paramount in the British industries which are now struggling against the tide of world changes which were at the same time obscured and accelerated by the Great War. It tends to confuse discussions on the need for a new policy, and it retards adaptation to the changed conditions. In Germany, on the other hand, the limitation of competition within the principal industries before the war, the active interest of the Government in the development of manufactures, and the accumulated experience of co-operative effort, prepared the way for the post-war rationalisation.

For the organised workers particularly, rationalisation has raised new questions of policy which must assume an ever-increasing importance in trade union discussions as well as in the deliberations of the organisations of employers. The German trade unions were compelled by the sharp pressure of events to realise the need for a re-examination of their relations with the new capitalism, and without delay they adopted a characteristically logical and clear-cut programme.

One of the first effects of rationalisation in a depressed industry which has to be contracted either temporarily or permanently is a displacement of

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“surplus” workers. This proceeds apace as the process of closing down the less efficient or suitable works, and concentration of production in the modernised works, is carried out. The co-operation of the workers in these circumstances can only be gained if it is possible to convince them that the creation of conditions favourable to a subsequent expansion of general industry, following the reduction in costs of production, is the principal aim of rationalisation. The justification of the process in Germany was the fact that drastic reconstruction was the only alternative to collapse, but it can certainly be shown that up to a point there was a rapid stimulation of miscellaneous trades. Despite a large displacement of workers in the first stage of rationalisation, the subsequent general recovery had the effect of reducing the total volume of unemployment to a level not much higher than that of the pre-war days, although the total number of people engaged in industry, including a new army of women workers, was much larger.

For the workers, the most important immediate question is : What is to be done with the “redundant” workers in the transition period? Are they to be left to the ordinary resources of relief, or is it an obligation of a Government to make special provision for them? In Germany there was no national system of unemployment insurance until last year, but the principle of State obligation to do everything possible to mitigate the hardships resulting from measures adopted in the national interest was fully admitted. For the year 1925-6, when the need was most urgent, a sum equal to about sixty millions sterling was budgeted for to provide special unemployment relief to tide over the

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serious crisis of that period. In addition, the State departments and municipal authorities hurried forward much public work, including roads, waterways construction, light railways, new power stations, and extensions to the network of overland cables, so that the expenditure on unproductive relief might be reduced as far as possible, and the demand for labour on ordinary industrial terms, as well as for materials of all kinds, might be stimulated.

It cannot be doubted that great savings in many directions are gained by rationalisation if the process is applied on a sound plan by men of outstanding ability. Who is to receive the benefit of the savings is again a matter of policy. Rationalisation may be carried through in a ruthless and anti-social spirit for the benefit of a few powerful industrialists and a limited number of shareholders, but such a policy would sooner or later sweep away the benefits altogether. It would imply monopoly prices, tend to limit consumption, make further restriction of output necessary, and antagonise the workers.

Rationalisation can only be permanently beneficial if the aim is to increase consumption by cheaper production and lower prices, so that the contracted basis of output which is necessary at the beginning may be expanded gradually as the demand rises. The control of industry in this spirit may be described as a process of modified socialisation. The men responsible for the administration must be experts in their respective spheres, and the influence of the technical and scientific men will tend to override demands for excessive dividends. In Germany it is held more and more firmly that industry has no place for ornamental directors.

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and that the problems of management have to be studied as closely as technology and industrial science.

In rationalised industries finance must be conservative, ample provision must be made for constant re-equipment and improvement of plant, and the savings must be fairly divided between the management and workers, consumers, and interest on capital.

If, as a result of the joint discussions on reorganisation and industrial relations in this country, the trade union movement as a whole follows the lead of the General Council of the Trade Union Congress, and decides that the interests of the workers will be best served, not by opposing rationalisation, but by striving to influence its development, it is on these questions of public policy that attention will first be concentrated most fruitfully.

CHAPTER I

COALFIELD RECONSTRUCTION

In the mining area of the Ruhr we are able to see how rationalisation has been carried out in an industry organised in a manner which might be described as half way between unrestricted private enterprise and complete trustification. On its productive side the Ruhr coal industry is controlled by a small number of separate concerns, ranging from a family firm like Krupps to the powerful Steel Trust, which produces twenty-six million tons annually, or nearly one quarter of the total output of the coalfield. Several groups, formed by successive amalgamations, produce from five to eight million tons a year. The State mines, which are now administered for the Government by executive directors exactly on the same lines as the rest of the industry, produce about seven million tons a year.

It would have been truer to say that these companies control their own concerns only on the technical side. That is to say, each undertaking decides its own policy for winning and utilising coal, but the amount to be produced is determined by the all-embracing Westphalian Syndicate, which fixes output quotas, and is responsible for selling that part of the output which is not used at the mine, in the coal utilisation works,

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or in associated iron and steel works. Thus the industry is organised in a number of combines so far as ownership is concerned, and for commercial and output regulation purposes it is constituted as a highly developed form of cartel, or association of separate firms to achieve for an industry a control of production and prices which would be possible otherwise only by complete trustification.

A more interesting industrial study of its kind than this evolution of the German coal industry since 1893, when the first attempt at syndication was made, could hardly be imagined, but this is outside the scope of the present work, save in so far as it is necessary to indicate how it became possible to rationalise with such amazing swiftness an industry which was neither completely trustified nor nationalised.

The evolution of the cartel system in this industry between 1893 and the beginning of the war was not accomplished without difficulties. There was periodical trouble over quotas. In the early days the number of owners was much larger than it is to-day, and many of them controlled but a relatively small output. The owners of the big mines chafed at restrictions imposed in the common interest, and the spirit of co-operation which has helped to save the industry from disaster since the war was fostered slowly. The owners of combined undertakings—coal-mines and iron and steel works—had a great advantage, as they were able to use in their own works a large part of their output apart from the quota, and so keep their mines in full production, while firms which had to sell the whole of their output were compelled to work short time. These inequalities were smoothed out as experience

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accumulated, and methods and regulations were modified in accordance with that experience.

Consequently, when the conditions of crisis following the French occupation in 1923 compelled the colliery owners to adopt the new policy of rationalisation, the quota system was already so adjusted that production was shared out as equally as possible, the combined undertakings having one quota for own use and one for sale through the Syndicate. The commercial side of the Syndicate's activities was so organised that losses incurred in price-cutting competition in the export market were borne by the whole industry. Membership of the Syndicate had also been made compulsory just after the war by a Government decree, which directed that a separate syndicate should be set up in each German coalfield—including the lignite, or brown coal, areas—and that all the firms engaged in production should become members.

Before the war the mines owned by the State in Westphalia had become associated with the Syndicate after a period of hostility and competition. After the war the method of administering and controlling these mines was changed. A company was formed to act as executive agent for the State, and it was charged with full responsibility for operating the mines, just as though they were under ordinary commercial company control. This company was, of course, a member of the Syndicate, and it carried out the process of rationalisation exactly as the other companies did.

During the twenty-one years of development of the Syndicate up to the beginning of the war, there were notable changes in the organisation of the industry in

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relation to ownership and technical equipment. The early quota difficulties gave the first impetus to an amalgamation movement. As the number of producing concerns became smaller, the tendency towards co-operation for various purposes was strengthened, and the concentration of capital resources made it relatively easy to maintain a steady process of modernisation of plant and to bring the equipment of many of the older mines up to the level of the new ones. At the same time, the rapid growth of the dyestuff and other chemical industries, and the rise of a powerful iron and steel industry, partly in close association with the coal industry itself, stimulated the extension of the coking and by-product undertakings of the mining companies.

A further advance in the equipment of the mines with labour-saving plant was made during the war, when the best of the young mine-workers were in the army and production had to be maintained, as in Great Britain; by the importation of a large number of less competent men into the industry. When the war ended, therefore, the coal industry, alike in its production, utilisation, and commercial branches, was highly organised, and animated throughout, on the owners' side, by a spirit and habit of co-operation which those engaged in the intensely individualistic and inter-competitive British industry find exceedingly difficult to understand.

Then came the chaos of the inflation period, only to be intensified, before the restoration of the currency took place, by the virtual collapse of the industry during the occupation by the French. To those who visited the Ruhr during the occupation, and saw the state of

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desolation to which the whole area had been reduced industrially—closed mines and works everywhere, the breakdown of the intricate system of rail transport, and the destitution of the workers—it seemed impossible that there could be anything approaching to a restoration of full vitality for many years.

During all this period of turmoil no estimate could be formed of the condition of the European coal industry in relation to market demand and productive capacity. The British stoppage in 1921, and the following upheavals in the Ruhr, made it impossible to observe accurately the effect of the changes which were deeply affecting the industry. These were the growing use of oil, of water-power electricity, and of lignite, or brown coal; together with the development on a big scale of the scrapping of old furnaces for the new fuel-saving types, which not only consumed less coal but made possible the use of small stuff and dust which formerly had been either a waste or very low-priced product.

Consequently, it was not until 1924 that some measure of stability was established, and an orderly effort to restore the industry gave sufficient experience to form a judgment on future prospects and needs.

Both in Germany and Great Britain it was believed at this time that there would be a gradual and substantial recovery of trade as the economic position of Europe improved, and the optimism of the British owners went so far as to anticipate an extension of the export trade beyond the boom limit of 1913. Before 1925 was far advanced the German owners had convinced themselves that these cheerful expectations

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were unsound, and that for several years, at any rate, the world demand for coal would remain far below productive capacity. For nearly three years longer, however, the British owners held tenaciously to their belief that the only issue was one of wages and prices, and that, if these could be reduced, trade would flow back.

The difference in the outlook of the two groups of owners may be attributed to :

The fact that the German owners were in more intimate contact with the general economic and industrial developments on the Continent.

The wider knowledge of the officials of the Westphalian Syndicate, who had acquired the habit of making extensive surveys of the state of trade to enable them to be constantly preparing and revising plans for future operations and output quotas.

The narrow outlook and limited knowledge of European conditions of many British colliery owners, and the lack of an adequate central intelligence organisation for the whole industry.

The traditional belief, fostered by a long supremacy in the export markets, that the quality of British coal would give it pre-eminence in almost any circumstances.

It was inevitable, in view of this divergence of belief regarding the prospects of the industry in the years immediately following 1924, and of the sharp contrast

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offered by the organisation of the industry in the two countries, that the policy adopted by the German owners should differ fundamentally from that chosen by the British owners. In any event, the chaotic condition of control to which the British industry was reduced by extreme individualism would have rendered it impossible for a comprehensive plan of reorganisation to be swiftly prepared and carried into effect. In this situation, therefore, given the stubborn belief of the owners and the temperament of the British miners, the policy of simple reliance on lower production costs, achieved by cutting wages and extending hours, could lead only to the crisis which was postponed by the subsidy of 1925, and which culminated in the futile conflict of 1926.

In the Ruhr, it is true, there was uncertainty and groping for a brief period, but, after a comprehensive stocktaking, the decision was taken to reconstruct the industry in an effort to adapt it to the new conditions, as the only alternative to bankruptcy. What was done may be likened to a surgical operation, and the process was a ruthless one, in the sense in which a surgeon is ruthless. Lord Melchett (formerly Sir Alfred Mond) has described the long-drawn-out agony of the British mining population as a surgical operation without an anæsthetic, but there is usually some definite purpose in an operation, and it would be difficult to discover one in the desperate drift of events in the British coalfields from 1925 to 1927.

The German Government did its best, in the difficult circumstances of the time, to provide an anæsthetic by the allocation of the funds already mentioned, from which special unemployment benefits were paid to the

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workers displaced in the rationalisation process. A measure of hardship had to be endured, nevertheless, but, when the policy is examined in the light of results, it has to be admitted that the arguments for drastic treatment were justified. One may hold, however, that in different circumstances from those in which the German Government found itself in 1924, much greater help might be given from national sources in such an emergency.

The total amount of distress caused by the crisis in the German industry since 1924 has been much less, relatively— that is, making allowance in the comparison for the different size of the two industries— than the widespread and persistent misery in the British coalfields. This will be seen more clearly when we come to discuss the results of the German reorganisation.

The end of 1924 is a convenient starting-point for an examination of the rationalisation process, and the conditions which impelled the Ruhr owners to adopt it and carry it through. By this time the Syndicate was functioning completely again after the French occupation. The renewed quota arrangements were necessarily of an experimental character, and it was soon apparent that even the modest view of market requirements taken at this time was too optimistic. Stocks had accumulated, and there was short-time working at many of the collieries. Difficulties in connection with the rationing of output, which had not arisen when the industry was gradually expanding, now appeared in an acute form in the new situation created by surplus productive capacity and the diminished demand for coal.

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A brief study of the following tables will enable the reader better to understand the circumstances in which rationalisation was undertaken, and the notable change in the fortunes of the industry which had taken place even in the sixteen months before the British stoppage.

It should be noted that figures derived even from different official sources vary to some extent. Those given here are mainly from the documents of the highly organised and reliable intelligence and statistical department of the Westphalian Mine-owners' Association. In all the statistical references, where German weights are given in tons, metric tons are indicated. The figures relating to individual output per shift are English weights translated from kilogrammes.

TOTAL PRODUCTION OF RUHR COAL

<i>Year</i>	<i>Total Output tons</i>	<i>Number of Workers</i>	<i>Stock of Unsold Coal tons</i>
1913	114,487,000	397,000	1,589,000
1920	88,400,000	453,000	1,608,000
1921	94,473,000	547,000	1,536,000
1922	97,462,000	553,000	617,000
1923	42,209,000	—	—
1924	94,411,000	463,000	5,169,000

Note.—As in Great Britain, the number of workers increased as the former miners returned to the pits after demobilisation. After the French occupation many workers, including a number who had been prominent in Communist upheavals, were not re-employed.

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AVERAGE OUTPUT PER MAN PER SHIFT

Year	Hewers and Assistant Hewers cwtls.	All Underground Workers cwtls.	All Workers Above and Below Ground cwtls.
1913	34.4	22.8	18.6
1920	27.2	15.8	12.4
1921	27.6	15.9	12.3
1922	28.1	16.0	12.5
1924	31.1	21.2	16.8

Note.—The heavy fall in the output per man per day in the period 1920–2 was attributed partly to the number of relatively inefficient wartime workers still left in the mines, and partly to the impoverished and ill-nourished condition of all the workers at this time. By the end of 1924 only skilled workers were retained at the coal face, and a rise in wages, in conjunction with a marked improvement in the food position in Westphalia, and also to the first effects of further improvements in the mechanical equipment of the mines, accounted for the all-round increase in individual output, and the near approach to the 1913 level.

A few other figures may be noted here. Taking the price of one of the standard qualities of coal, we find that in 1913 it was 12s. 6d. per ton. In 1918 it was 28s. 7d., and 21s. 8d. in 1923. The necessity for stimulating demand led to a further fall to 17s. 6d. by July 1924, and to 15s. 9d. by October 1924. The renewal of keen competition for the overseas trade had driven down the export prices much lower than this, and altogether heavy losses were incurred. Since October 1924, the inland prices of coal in Germany varied little until the permitted increase in 1928 following a new wage award. They were not changed during the whole period of abnormal demand caused by the British stoppage in 1926. Apart altogether from the exceptionally high

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profits made in the second half of 1926, the industry was restored to a profit-making basis during 1927, under more normal market conditions, with wages raised to the 1913 level by the process of rationalisation.

The minimum wage rate for a hewer in 1913 was 6s. 6d. a day. In January 1924 it was 6s. 2d., so that the purchasing power of the wage at this time was far below that of 1913. So bad were the conditions that, despite the critical state of the industry, some increase could not be denied, and the daily wage was advanced to 7s. 6d. by July 1924, and to 7s. 9d. by January 1925.

The average daily wage of all workers was 5s. 4d. in 1913 ; 5s. 6d. in January 1924 ; 6s. 4d. in July 1924 ; and 6s. 8d. in January 1925. At this time also the real wages were much less than those of 1913.

The foregoing figures will help the reader to understand the general state of depression of the industry at the end of 1924. During the next few months there was a rapid and, from the point of view of both owners and workers, alarming development of the crisis. Not only was the inland sale of coal falling, but the production of many of the best mines was adversely affected by the reduced demand from the iron and steel works associated with the mines.

The daily output in January 1925 was 378,614 tons, and this declined steadily to 331,855 tons in June, or 87 per cent. of the January amount. The number of workers was reduced in the six months by about thirty thousand, owing to the enforced closing of some of the worst-situated mines, and of excessively costly seams in other mines. In the same period the output per man per day improved by just under 1 per cent.

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While the home market slumped badly, there was a small upward movement in the export trade.

This was the period of uncertainty in action. The first impulse was to rely on short-time working, in the hope that before very long there would be a spontaneous improvement in trade. In January the number of holiday shifts, owing to lack of trade, was 182,674. This jumped to 369,950 in February, and it was 614,221 in March, by which time several of the companies had taken the decision to carry out the new reorganisation policy energetically. In April the number of shifts lost was 876,000, and in May 355,000.

Meantime the stocks of coal and coke at the mines had increased in spectacular fashion. From just over five million tons at the end of 1924, the amount rose to 6,320,000 tons in March, by another half million in April, and so on up to 7,163,000 tons in June. Taking both the mine stocks and the coal in the Syndicate's barges and depots, the unsold coal and coke amounted to 7,421,000 tons in January 1925, and to 9,378,000 in June.

Apart from the heavy loss involved in the accumulation of these huge stocks, the effect of the short-time working made itself felt, especially at the large, highly capitalised mines, in rapidly mounting production costs in relation to the output. Simultaneously, the conviction deepened that the hoped-for improvement in trade was not going to be realised, and that only the most drastic measures of reconstruction could save the industry from ruin.

In such a situation as that in which the owners and workers now found themselves, simple regulation of output by quota rationing was useless. Rising costs,

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increasing unemployment, and diminished earnings at daily wage rates, which were already well below the 1913 rates in purchasing power, could not possibly be avoided, and the evils were indeed intensified at some of the mines by the output limitation.

One alternative was to let the process of the survival of the fittest take its course, as it has done so far in Great Britain, with the pressure gradually forcing the weaker mines out of production, and virtually all the workers suffering from extreme destitution month after month, with the remotest prospects of amelioration.

The other was *Rationalisierung*—that is, concerted action by all in the industry to bring about without delay such changes in organisation as would make possible the achievement of the lowest possible production costs while effective regulation of output was maintained.

In an official statement published at this time the declaration was made that, owing to the failure to realise the hopes of bringing about a betterment of trade by the means so far adopted, it was impossible for the mines to continue in operation if the short-time expedient alone was relied on.

“The industry must proceed to more rigorous measures,” the statement proceeded, “such as the limitation of output to the best seams, the further grouping and concentration of the mines and works with the object of attaining greater economies, the closing of parts of mines and finally of whole establishments.”

Already a number of small collieries, opened up during and just after the war, had been forced out of existence, and during 1924 nine of the larger of the old

mines had been shut down. This process was quickly extended after the adoption of the new policy in the early part of 1925. Four mines were closed between January and May, and in July seven, which would be regarded as fair-sized pits in most of the coalfields of Great Britain, were put out of production. Over 8,000 workers were employed at these seven mines. During the whole of 1925, twenty-six medium and large mines, employing 37,000 workers, were closed.

At this time over 90 per cent. of the total output was controlled by fewer than twenty companies. The choice of the mines to be closed completely was determined mainly by unfavourable geographical situation and geological conditions, and high production costs. In some cases closing down followed new amalgamations, and, in still others, obsolete mines were purchased by the wealthier groups solely for the purpose of transferring the output quotas to the largest modern or modernised mines, and operating these at full capacity to give a better ratio between overhead charges and output.

This concentration of output, with the object of reducing costs, was achieved on an even more extensive scale by abandoning or suspending production in those parts of the big mines which were most expensive to work. Full-time working in selected districts was far less costly than the dispersal of short-time labour over the whole mine, and the best of the closed districts or seams were maintained in a workable state, so that, immediately there was an improvement in trade and an increase in the production quota for the mine, the output could be expanded accordingly.

The fact cannot be overstressed that these measures

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were part of a carefully thought-out, concerted plan. The mines and seams to be closed were chosen for specific reasons, related to the general aim of cost reduction. They did not go out of operation owing to the haphazard pressure of financial difficulties, as was the case with many of the British abandoned mines. These ceased production in circumstances which had little or no effect in rescuing the industry from its troubles. Despite the closing of many mines in the British coalfields during 1924-6, and again after the stoppage of 1926, short-time was still general over wide areas, and little was done to eliminate the many forms of waste which handicapped the industry as a whole.

A concerted British plan, comparable to that of the Ruhr owners, would have assumed that for some time to come the industry should be organised for an output of round about 250,000,000 tons annually, with provision for speedy expansion if demand tended to rise. The mines and seams to be closed would then have been selected according to situation and costs. It is obvious, however, that such an ordered collective, reconstructive effort would only be possible in an industry either entirely unified, or controlled by a relatively small number of owning groups capable of acting in the closest co-operation. Hence it may be asserted that in the state of the British industry during this period of crisis the first important step in technical rationalisation—the concentration of production in the most economical works for the purpose of reducing uneconomical short-time working to the lowest possible limit—could not have been taken without a preliminary grouping of ownership.

Big-scale ownership and organisation were no less

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necessary for the next stage of development in the Ruhr. In the rationalisation scheme, as it was conceived by the most alert and far-seeing leaders of the industry, no cost-reducing factor was to be ignored. The savings through concentration of production were not enough. Nothing short of the highest degree of efficiency, both of machines and labour, would suffice.

Therefore, having eliminated the units of production which were regarded as hopelessly inefficient, or reaching only a standard of second-rate efficiency whatever effort might be made to improve them, the complete modernisation of all the mines maintained in production was accelerated. An outstanding example of the boldness of this re-equipment was the replacement ~~of some~~ of the newest mines, opened in 1917, of comparatively up-to-date boilers by an improved type so economical in its fuel consumption and efficiency that the capital cost was repaid by the savings in two years.

This kind of technical reconstruction proceeded apace throughout the coalfield, but it could have been undertaken only by big combinations with ample capital resources or substantial credit, coupled with a reputation for successful enterprise. Notwithstanding the conditions of acute crisis, there was no other course for the majority of the companies except to borrow money for the reconstruction or to capitulate to adverse fate.

Speaking broadly, the seams in the Ruhr mines are unsuitable for the use of the larger coal-cutting machines. Some were already in use, and others were provided wherever they could be employed, but the principal development in underground mechanisation

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was the extension of the use of compressed air hammer drills and other hand implements of this type. By 1927 very few men were left to wield the old-fashioned pick at the coal face.

The progress already made in this respect by the middle of 1925 is indicated by the fact that the mechanical help available for each hundred hewers rose from 4 to nearly 15 horse power for machines, and from $8\frac{1}{2}$ to $42\frac{1}{2}$ horse power for hand implements. The use of conveyors at the coal face became almost universal. Pit ponies disappeared, and much of the old underground haulage plant on the main roads was also superseded by speedier compressed air or electrical locomotive engines. The estimated number in 1927 was two thousand. With the growing use of locomotives, the "riding in" of the men to the coal face was quickly extended. This gave more actual working time within the eight-hour "bank to bank" shift, and the men reached the working places much less tired than after a long walk from the shaft.

English mining engineers and managers would criticise the extensive use of unguarded cables for the electrical locomotives, which are used on the roads free from gas because they are much cheaper to operate than the compressed air engines employed in the fiery parts of the mines.

Both at the bottom and top of the shafts new automatic devices for loading and unloading the cages were rapidly and generally installed, and this, in the aggregate, has eliminated a vast amount of the physical labour of pushing and pulling the tubs. At the pithead the aim is to cut out all labour for the movement of the

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coal from cage to screens, except that required for the electrical control of the automatic plant.

Improved screening and grading machinery ; new or modernised washeries, in which output is increased from 50 to 70 per cent. with the same or less labour ; new labour-saving and fuel and steam economising plant for electrical and compressed air production ; and modernised engineering and repair shops, are other outstanding features of a technical reconstruction which impresses the visitor by its thoroughness and the purposeful energy with which it has been carried out.

Some of the collieries which have been opened during the last few years in the new British field of South Yorkshire and North Notts are superior as coal-producing enterprises to the best of the Ruhr mines, owing to the fine quality of the coal, the thickness of the seams, and the excellent equipment ; but the distinction to be drawn between the British and the German industry as a whole is that in the Ruhr the average is very near to the best, while in Great Britain it is very much below it. To express it in another way, it is impossible to find in Germany anything comparable to the contrast between the new or modernised mines in Yorkshire, Notts, South Wales, and Durham, and the hundreds of old, small, badly equipped, and deplorably uneconomic pits to be found in all the older coalfields of Britain. The difference between the industry in the two countries, in this respect, was very great, even before the war. Now, after rationalisation, it is about as wide as it could possibly be.

On the " coal-using " side of the industry, rationalisation was equally comprehensive and energetically pushed forward. In this sphere, comparison with the

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British industry is hardly possible. During the past two or three years several British colliery companies have extended their activities to the point of selling electrical current and surplus gas to neighbouring public undertakings, and one or two have for a long time been engaged in profitable by-product and chemical undertakings. These isolated instances of enterprise, however, only bring into greater prominence the fact that the Westphalian coal industry is entirely organised on these lines wherever coking coal is available. In the majority of British coalfields the mines are usually equipped for coal-getting only. Where there are coking and by-product plants, or arrangements for selling surplus gas, the revenue is not, as a rule, reckoned in the colliery accounts, which are taken as the basis of the calculations for wage-fixing purposes. These enterprises are run by subsidiary or separate companies.

In the Ruhr, on the contrary, almost every mine now left in production might be described as a huge coal-using factory as well as a coal-getting undertaking, and all the associated coking, by-product, and power enterprises are regarded as an integral part of the coal industry. The head chemist and the chief engineer share fully with the mine director the status of control and the responsibility for the progress and success of the enterprise as a whole. The Ruhr companies, indeed, are coming to look more and more to the revenue from these coal-using activities—coking, the production of raw materials and valuable “intermediates” for the chemical industries, direct association with public electrical supply undertakings, and the co-operative sale of surplus gas and steam for public services—as the most stable source of their profits.

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To these undertakings, during the process of rationalisation, they applied, as in the mines, the principle of concentration of production in the most efficient plants. The scrapping of coke oven and by-product plants, which were ultra-modern by comparison with the majority still in use in the British coalfields, has taken place on a gigantic scale. Intensive technical research, carried on by the great American and German coke oven manufacturers since the war, produced notable improvements affecting labour-saving, the time occupied by coking, the capacity of the ovens and daily output, the general efficiency of the plant, and the quality of the product.

The savings in cost were so great that the replacement of plant installed only two or three years earlier was undertaken at many of the collieries—especially at those belonging to the Steel Trust, Krupps, and other combined coal and steel companies. The economic and competitive effect of this development was tersely described at the end of 1927 by the manager of one of the few up-to-date plants in Great Britain—Mr. A. H. Middleton, of the Consett Iron Co. Ltd.

After a reference to the German rebuilding “on the most up-to-date lines, with every conceivable labour-saving device,” he added :

“The total labour cost of these plants, when complete, will be 10*d.* to 11*d.* per ton of coke produced. . . . Contrast this activity with the position at home, where only three or four new plants have been built in the last three years, and probably less are being built at present. Yet the great majority of plants in this country are obsolete from a money-making

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point of view, because of their' high labour costs. The average total labour cost, from coal going in to all products coming out, is 5s. per ton of coke produced, compared with the 10d. or 11d. previously mentioned for the new German plants. . . . It is obvious that the owners of these obsolete, or inefficient, plants will very soon have to rebuild them or they will be forced out of business. They will be unable to compete in the export market, and will, to a very large extent, lose the home market by forcing the iron and steel maker out of business, or by compelling him to import coke, as he certainly cannot, on the top of his other disadvantages, afford to pay for his coke this extra 4s. more than his Continental competitors."

The fact that between 1923 and 1928 millions of pounds were spent on new coking plants indicates the scale on which rationalisation was undertaken in this branch of the industry. Both old and comparatively modern plants were scrapped, and the new ones were built in smaller numbers to give a larger concentrated output at the most economical centres. From the published technical information about the latest plants, opened in the spring of 1928, one gathers that, whereas before the war a typical group of ovens would produce between 700 and 800 tons of coke a day, with thirty or forty workers engaged on each shift, a daily output of from 1,700 to 1,800 tons is now obtained from fewer ovens, which are much higher, narrower, and coke

¹ *The Iron and Coal Trades Review*, Diamond Jubilee Issue, December 1927, pp. 72-5.

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more rapidly. The electrical mechanism is so complete that only five workers are engaged on each shift for all the operations, from the bunkering of the coal and filling the ovens to loading the coke into railway waggons.

The fifteen workers engaged on the three shifts are thus able, solely by controlling machines and conveyors, to perform all the operations necessary in, say, 120 ovens, for producing and disposing of 600,000 tons of coke a year. It is obvious from this that wages are almost a negligible factor in reckoning costs of production. No further evidence is needed to support the finding of a Commission of Investigation, to which further reference is made shortly, that the net profit on the modern coking and by-product plants is 4s. 6d. per ton of coke produced.

From one of these latest combined plants there is a daily yield of 80 tons of tar, 27 tons of sulphate of ammonia, 20 tons of benzol, and sufficient gas to heat the ovens and leave a surplus of 14,000,000 cubic feet to be sold or used for other purposes. The ovens are so constructed that as the demand for gas for the long-distance public service supplies, and for the fixation of nitrogen by a new process, gradually increases, they can be heated by producer gas from lowest grade coal, with the result that a maximum quantity of 24,000,000 cubic feet of the more valuable coke oven gas would be available each day for sale or utilisation.

The first development of a long-distance gas supply through high-pressure mains took place before the war, and by 1926 the main pipe line, supplied from huge containers placed at convenient centres, had been extended for a hundred miles in a devious course

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through the Westphalian and Rhineland towns. This surplus gas could be sold to the public supply undertakings at much less than the cost of producing town gas, so that, beginning with contracts for quantities to supplement the local output, there had been a gradual scrapping of the isolated gasworks in many towns.

In 1926, as part of the rationalisation plans, the whole of the colliery concerns in the Westphalian Syndicate formed a company, known as the A.G. für Kohlenverwertung (Coal Utilisation Company), with the object of arranging contracts to extend these long-distance services over a large part of Germany, and to organise research to discover new scientific methods of using coal and increasing the revenue of the industry.

An estimate generally accepted by experts showed that the total amount of surplus coke oven gas available annually was about 8,000,000,000 cubic metres, or 290,000,000,000 cubic feet. Very strong opposition was manifested in many towns (including Berlin, which it was proposed to include in the scheme) on the ground that an impregnable monopoly would be created if the plans of the company were realised. Against this it was argued that such a vast concern, controlling a public necessity so important, would be amenable to the most drastic State control if its policy were against the public interest. Another factor which influenced opinion in favour of the scheme was the close association between the company and the R.W.E.—the great Rhineland-Westphalian electricity concern, which possessed the wayleave rights to be used by the gas supply concern within the R.W.E. territory—and the possibility of the development of the Coal Utilisation

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Company into a semi-socialised corporation, on the lines of the R.W.E., with State, municipalities, and industry owning the capital jointly, was not lost sight of.

During 1927 the opposition was overcome in certain districts, and the construction of some of the new long-distance mains was put in hand. A contract with the city of Hanover opened the way for the construction of a line to that city, a distance of 136 miles, and for the offer of supplies on favourable terms to the intervening towns and villages. The ultimate aim in this direction is the extension of the main to Berlin and the Central German cities, with branch lines to Hamburg, Bremen, and the northern centres.

An example of the terms of sale, and of the advantages offered to the gas companies or municipal undertakings, is afforded by a contract entered into by the town of Buer for a period of fifteen years to take a minimum supply of 150,000,000 cubic feet a year, rising to a maximum of 350,000,000, from the coke ovens of the Recklinghausen Colliery Company, which is a member of the Coal Utilisation Company. The cost of producing town gas in Buer at the time of the signing of the contract was, roughly, 1s. 5d. per thousand cubic feet. The contract price was 10d. for ordinary purposes, and 9½d. for street lighting. In this town the gasworks are to be kept in operation for the present, the coke oven gas being supplementary, and the cost of delivering it to the gasworks is borne by the colliery undertaking. On the one hand, the town will save over £4,000 a year at the beginning, and about £10,000 when the maximum supply is taken. On the other, the revenue of the colliery company will be substantially increased. When this mutual advantage

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is considered in relation to the magnitude of the gas supply service as a whole, the full benefit of this phase of rationalisation may be realised.

Experiments are also being made in connection with a scheme for long-distance heating by steam forced at high pressure through leak-proof pipes either from sources of waste steam or from central installations where it can be produced very cheaply. By this means it has become possible for large buildings in the towns, especially such public institutions as hospitals, schools, museums, art galleries, and municipal buildings, to be heated at very low cost, and without labour.

It might be thought that the diminution in coal consumption resulting from these services would be regarded by the colliery owners as against their interests, but the Ruhr owners and managers have convinced themselves that in any event fuel economies will be sought in every possible direction, and that their wisest possible course is to adapt the coal industry as speedily as possible to these new conditions. In the future, profits will be looked for less from coal producing and more from the extension of its scientific use, and from all the products which in the past have gone to waste in prodigious quantities.

From this point of view it is better to gain revenue from the sale of surplus products that would otherwise be wasted, and to produce only the amount of coal that can be utilised with the maximum economy. In the pursuance of this general policy the Westphalian Syndicate has resolved to aid in every way the development of fuel economy boilers throughout German industry. It has gone so far as to send its own fuel technologists to the works of its customers to study the

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boiler plants, to give advice as to the most suitable kind of coal to use, and to arrange that the agents of the Syndicate supply this coal. Apart from the conviction that industrial waste cannot be justified under any circumstances, this policy is also determined by the expectation that in the long run savings in the cost of fuel will tend to increase the demand for coal by the stimulus given to all kinds of miscellaneous trades. This is an aspect of the question of the rationalisation of the "basic industries," which will be discussed further in the chapter dealing with general results and the effect of rationalisation on the community as a whole.

The new process for the fixation of nitrogen from coke oven gas, registered under the name of the Concordia-Linde patents, first experimented with by the Concordia Company for a number of years, and recently by the Mont Cenis Company, brought about an important extension of the scientific industrial activities of the Ruhr colliery owners in the early months of 1928.

Over twenty concerns, including the Steel Trust and Krupps, have combined to form a new company, supported by an American loan of £800,000, for the exploitation of the process. It is estimated that if all the coke oven gas available in the Ruhr were used for nitrogen production, a large part of the present world demand could be met, and the process is stated to be cheaper than that employed by the Chemical Trust at the Leuna works. The beginning will be on a modest scale, however, with one plant with an annual capacity of 18,000 tons of nitrogen. The possible effect of this development in accelerating a movement for the closer

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association of the three great industries—coal, iron and steel, and chemicals—is discussed in a later chapter.

In a non-technical book, written for the general reader, one must pass over various other developments of less importance in the field of research and fuel utilisation in the Ruhr which have a particular interest for the industrial chemist and the engineer.

These activities do not belong strictly to the process of rationalisation, but they are essential as supplementary measures if the full harvest of gains is to be reaped. They could not be extended, as they are being at the present time in the Ruhr, except in an industry which, through technical reorganisation and the capacity of its controllers for co-operative action, had attained to a very high standard of efficiency in all its productive branches. The same comment might be made on the commercial policy evolved by the Westphalian Syndicate. The closer combination and co-operation among the colliery companies, which has made such a comprehensive process of rationalisation of production possible, has removed some of the more serious difficulties with which the Syndicate had to contend in the earlier days, when the corporate spirit was not so fully developed throughout the industry.

Since the war, therefore, the directors of the Syndicate have been able to exercise a much more effective control over the sale of coal, and especially over its preparation for the market. Rarely, indeed, is the charge seriously made in Germany that the general policy of the Syndicate has been anti-social, or against the interests of consumers. The stabilisation of prices has been consistently a guiding principle for thirty years, and this has enabled industrial users to

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plan ahead with an assurance that fuel prices would not be arbitrarily changed from time to time.

The post-war policy, designed to support in every possible way the efforts to increase the revenue and profits of the rationalised industry, has prompted strenuous efforts to meet the wishes of all classes of customers, and to overcome the disadvantage of inferior qualities of coal, as compared with the British, by analysis, classification, and blending. In the spacious laboratories in the Syndicate building at Essen a staff of highly qualified fuel technologists and chemists is constantly engaged on work of this kind, and in the investigation of complaints from customers. Whenever it is required, coal is sold under specification, and the power of the Syndicate is now so well established that the instructions of the directors responsible for liaison between the Syndicate and the mine managements are carried out implicitly.

CHAPTER II

THE FIRST RESULTS

We can now turn to an examination of the first effects of the rationalisation process that has just been described, but in doing this one should keep steadily in mind the conditions of acute crisis at the starting-point. From the time when the effects of the inflation began to be serious in 1920, until a year after the end of the French occupation of the Ruhr, the industries of Westphalia were in such a precarious position that only a small accentuation of the difficulties might have plunged them into the abyss of ruin. There is a wide-spread belief in other countries that all the re-equipment was accomplished during the inflation period, and that, by the easy redemption of mortgages and other obligations by payment in paper marks, the heavy industries particularly gained very great advantages.

This is true up to a point, but these advantages were submerged in the tide of adverse circumstances created by the bad trade and general impoverishment of the whole country; the enforced stoppage of the industries for nearly a year while the French made their futile effort to establish economic and industrial, as well as military, domination over

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Westphalia ; and the disappearance of all liquid capital resources in the final catastrophic stages of the inflation.

After the return to gold basis prices and the adoption of the rentenmark currency the industries were placed in a position of the greatest difficulty by reason of the financial stringency. During the inflation the national banks, directed from Berlin, had necessarily assumed a dominant position, and the industrial banks, with which the combines and cartels of Westphalia had been interlocked before the war, could no longer finance the industries. The price for accommodation in Berlin went up to 12 or 14 per cent. This was an impossible burden for the industries to carry, and it was not until ample supplies of American capital at a much lower rate of interest were available that a start on the road to recovery was possible. At this stage the only alternatives were bankruptcy or reconstruction by means of borrowed money.

Meanwhile, the whole of the working population of the Ruhr was living in a miserable state of poverty. From 1919 to 1922 food supplies were inadequate and wages were much below the pre-war standard in purchasing power. This condition grew even worse during the occupation. Wages were paid by the Government by the accelerated use of the printing machine, but sometimes the notes went astray, or were seized by the military, and in any event wages paid at a week-end would probably be only half the nominal value if kept until the Monday. For a period after the return to a gold basis of prices the suffering of the working-class families was acute. This happened before the inflation was stopped, and while prices advanced rapidly the

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value of earnings continued to fall. Crowds of hungry men and women gathered round the provision- and meat-shop windows during this period, commenting angrily on the new prices which it was impossible to pay. After a time, of course, wages were more or less adjusted to the new prices and the new currency, but, as we have already noted, the purchasing value of earnings at this time was far below that of 1913.

In judging, therefore, the value of the first fruits of rationalisation of the coal industry, and of the iron and steel industry which is dealt with in the next chapter, we have to stress this chaotic situation of financial difficulty, inadequate demand for coal, high production costs in spite of low wages, and the poverty-stricken state of the workers.

The effect of rationalisation on employment naturally takes precedence of all others in the minds of the workers in Great Britain. Hence, many readers will no doubt have been asking impatiently : How many men were displaced, and what happened to them ? How can rationalisation be justified if it throws men on the scrap heap ? These questions can only be answered fully in relation to the wider economic and industrial issues raised by this particular form of reorganisation. An attempt will be made to do this in a later chapter, for the questions are certainly of predominant interest, and it is obvious that the attitude of the workers and the trade unions will be determined mainly by the reactions of rationalisation on the labour problem generally.

Here we note only the more important of the wider considerations which arise in this connection.

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(1) The wages, hours of work, and general conditions of those who are left in the rationalised industries.

(2) The effect of lower production costs and prices in stimulating other trades and industries, so creating a wider labour market and making possible a gradual absorption of the displaced workers.

(3) And the status of the workers in the big-scale productive organisations necessary for effective rationalisation.

These are all of the highest importance, and must be discussed together after the adaptation of the rationalisation process to other industries and its effect on production have been described. For the moment, therefore, it will be more convenient to continue our record.

The extent to which displacement of labour occurs will depend on the circumstances of each industry. In the Ruhr coalfield, where, as in Great Britain during the same period, the number of workers in the mines up to 1924 had been increased by a mingling of demobilised men with those who had been drawn to the mines from other occupations during the war, the number displaced was bound to be large, having regard to the growth in productive capacity of the industry as a whole and the decline in demand for coal.

Another factor is the duration of the displacement. If a permanent contraction of an industry is called for the surplus workers must be maintained until they can be absorbed into other trades, or reabsorbed gradually

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into the rationalised industry by such means as the raising of the age of youths entering it, and the pensioning of the older workers. If, on the other hand, contraction is temporary, to create the conditions for restored economic health, and to provide a new basis of organisation for subsequent expansion, as in the case of the German steel and chemical industries, the reabsorption will take place rapidly, and the total number of workers in the industry will ultimately be increased. . . .

As was shown in the table on page 35, the total number of Ruhr mine workers increased from 397,000 in 1913 to a maximum of 553,000 in 1922. Then there was a fall to 463,000 in 1924. As the measures for the concentration of production by the closing of inefficient or costly mines and seams were put into operation, there was a further steady decline to 396,000 in December 1925, and to 355,000 in May 1926, when the British stoppage began.

Production then expanded to meet the larger export demand, and the number of workers rose to 415,000 in the early part of 1927, and to 418,000 by March of that year. This was the high-water mark. The labour-saving re-equipment and general mechanisation of the mines was continued, the high profits from export trade during the British stoppage having augmented the funds available for this purpose. In consequence, although the total production for 1927 was higher than that for 1926, and the monthly output in the closing months of the year was as great as at the beginning, the number of workers fell again to 400,000 in October and 398,000 in December.

Thus, there was a total displacement of no fewer

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than 198,000 workers between 1922 and May 1926 ; of 108,000 between 1924 and 1926 ; and of 41,000 in the first five months of 1926. The subsequent increase left the number of workers in the mines at the end of 1927 1,000 more than in 1913 and 155,000 less than in 1922.

The effect was proportionately severe on the technical and administrative officials. These were not spared in the throes of the crisis any more than the manual workers, as is shown by the following table of the number employed

1922	28,800
1924	27,700
1925 (January)	27,500
1925 (October)	24,500
1926 (April)	23,100
1927 (August)	23,500

No exact information is available to show what happened to the workers who were not taken back into the industry during the latter part of 1926. A general revival of trade set in during 1925, and the impetus given to certain industries—notably machine-making and building—by the reorganisation, re-equipment, and electrification which was going on all over Germany, created a demand for labour, as will be seen later when the general unemployment position during this period is examined. The same causes reacted favourably on agriculture, which, aided by the abundant supply of cheap synthetic fertilisers from the new factories of the rationalised Chemical Trust, began to enjoy a moderate boom. Some of the Ruhr mine

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workers went into the reviving town industries in other parts of Germany. Others who had come from the land to the mines returned to the farms, and many went into the building trade.

Those who remained unemployed received the special benefit, or "dole," from the Government funds mentioned in the introduction. The State benefit ranged from about 12s. a week for a single man to a maximum of 27s. for a married man with family, as compared with a possible 35s. or so from full-time wages at the period. These payments were continued for one year, if necessary, and, if the recipient was still unemployed at the end of the year, he received ordinary town relief, comparable to the British poor law relief. Owing to the heavy burden during this period of crisis the Government made a contribution to enable the urban authorities to meet this obligation.

The removal of "surplus" workers from an industry by rationalisation proved in Germany to be the only painful consequence from a human point of view, and, as will be seen later, the general revival of trade limited the duration of this evil effect.

When we turn to the economic side we discover results which may be justly described as remarkable, and they offer a partial explanation of the phenomenal change in the condition of the German people during the past three years. Keeping to the coal industry for the present, we will first take the figures which indicate most clearly the effect of reorganisation on production and labour costs. Variations in aggregate output may mean much or little, according to the number of

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workers engaged. Variations of individual output give a reasonably accurate index of the effect of specific causes.

The great decrease in the individual output of the various classes of mine workers during the period of extreme poverty and low wages—1920-2—has already been noted on page 136, as well as the fact that the average 1924 output was below that of 1913. Early in 1925 the 1913 standard was exceeded, although since 1924 the underground shift had been reduced to eight hours bank to bank, as compared with eight and a half hours bank to bank before the war. This new working time is roughly half an hour less than the British shift, which is eight hours plus one winding time. In comparing output after rationalisation in Germany, therefore, the fact that the daily working time underground is less by half an hour than before the war cannot be over-stressed. In the Ruhr, the individual output has been increased by reorganisation and mechanisation, combined with a reduction in working time, to a greater extent than in Great Britain by the extension of working time by one hour for the majority of the men employed.

In the whole of the British mines the average output of saleable coal per man per day, taking all underground and surface workers, was 17.70 cwts. for the year ending June 1925, when the shift was seven hours plus one winding time. This output rose by December 1927, with the eight hour shift, to 20.82 cwts., an increase of 17.7 per cent. The comparable increase in the Ruhr mines was from 18.6 cwts. in 1925 to 22.65 cwts. at the end of December 1927, or 21.8 per cent.

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The full development in the Ruhr is seen at a glance in the following table.

OUTPUT PER MAN PER SHIFT

<i>Period</i>	<i>Hewers and Assistant Hewers</i> cwt.s.	<i>All Underground Workers</i> cwt.s.	<i>All Workers Above and Below Ground</i> cwt.s.
1925	37	23	18.6
1926 (January)	40.6	25.6	20.7
1927 (January)	42.5	27.0	22.4

Note.—There was little variation throughout 1927.

These figures, with those on page 36, give the following percentage increases :

HEWERS AND ASSISTANT HEWERS

January 1927 over 1913	.	.	23.5%
January 1927 over 1924	.	.	24.6%
January 1927 over 1925	.	.	15%

ALL UNDERGROUND WORKERS

January 1927 over 1913	.	.	18.4%
January 1927 over 1924	.	.	27.4%
January 1927 over 1925	.	.	17.4%

ALL WORKERS ABOVE AND BELOW GROUND

January 1927 over 1913	.	.	20.4%
January 1927 over 1924	.	.	33%
January 1927 over 1925	.	.	20.4%
December 1927 over 1925	.	.	21.8%

Note.—The lower percentage increase for hewers and underground workers generally, January 1927 over 1925, is due to the fact that the effect of reorganisation was first realised at the coal

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face, so that by the later part of 1925 the output of these workers was already well above the 1913 level. Modernisation at the surface took longer to accomplish. The 1925 output was therefore raised only to the pre-war standard. Subsequently, the number of surface workers in proportion to underground workers was reduced by the installation of labour-saving devices, and the average output showed a greater percentage increase over 1925.

The production figures for hewers alone are sufficiently interesting to merit separate attention. The average per day in 1913 was 36.2 cwts. This had risen to 37.4 cwts. in 1924, after a serious decline in the period 1920-2, and the average for 1925 gave a further rise to 41 cwts. Towards the end of 1925 the amount was 43.2 cwts., and from that time there was a steady advance to just under 48 cwts. at the beginning of 1927.

Thus, the 1927 output was just over 31 per cent. greater than in 1913, despite the reduction of half an hour in the daily working time. The increase over 1924 was 27 per cent.

It is necessary to take careful note of these figures, if the full effects of rationalisation are to be comprehended. The remarkable increase in the hewers' output reveals impressively the result of the provision of mechanical aids at the coal face, and particularly of the policy of concentrating production in the best mines and the best seams in those mines. The net gains from the whole process of modifying and modernising the productive apparatus are seen in the increase in average individual output when the total number of workers is taken into account.

The value of a comparison of the total coal production of the industry as a means of estimating the advantages of rationalisation is lessened by the fact that

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the British stoppage created an abnormal situation, from which the Ruhr colliery companies would have profited in any event. The utmost that can be claimed for the heavy production and increased export sales of 1926, therefore, is that the lower production costs already achieved increased the export trade profits from which the later re-equipment was financed. It was proved during this period that the purpose of rationalisation, as the Ruhr companies conceived it, was the *economic regulation* of production to reduce costs, not the restriction of output to create a shortage, and to maintain prices at a profitable level whatever the production costs might be. As the demand went up the Syndicate quota percentages were increased, and output was quickly adjusted to the needs, the reserve working districts and seams being reopened as occasion arose. The State-controlled home prices remained unchanged while export prices soared.

We have already seen that the 1924 production—94,000,000 tons—was 20,000,000 below 1913. Reference has also been made to the growing difficulties that beset the industry in the early months of 1925, when short-time working was finally abandoned as an uneconomic method of meeting the reduced demand, and when the policy of rationalisation was adopted.

By the middle of that year the first effects of the new policy were perceptible, and from this time there was a gradual improvement, which continued, notwithstanding the keen price-cutting competition set up in the export market by the British owners and exporters during the subsidy period from July 1925 to the beginning of the 1926 stoppage. The lower costs resulting from the increased individual output and

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other economies enabled the Ruhr Syndicate not only to maintain unchanged the inland prices, which had been heavily reduced with the object of stimulating the home demand, but to meet the intensified British competition, which forced down the export prices by several shillings a ton.

The consequence was that production increased during the second half of 1925 to such an extent that the total for the year was 104,000,000 tons, an advance of 10,000,000 on 1924. The next year, with a rise to 112,000,000 tons, is removed from any normal comparison owing to the effects of the British stoppage. The export trade had been rising steadily throughout the later months of 1925 and the early part of 1926. It is impossible to say definitely whether this would have continued for the rest of 1926, but the experience of 1927, when the British price-cutting competition became still more acute, suggests that the increase of the Ruhr trade would have been maintained and extended even if the British subsidy had not been cut off.

During 1927 the British exports were increased by only 300,000 tons over 1925, although prices were reduced in some instances to the pre-war level. The Ruhr industry by reason of the accumulating economies attributable directly and entirely to the reorganisation, was able to face this price reduction, to increase its export sales, to carry on in the home market despite two refusals of the National Coal Council to assent to an increase in prices, to maintain the shorter working shift, and to bear a further increase in wages.

Apart from the few people who had closely studied the German reorganisation, nobody interested in the

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British industry believed at the beginning of the year that the Ruhr gains of 1926 could be preserved. It was confidently expected that when the stoppage period contracts expired there would be a slump in the Ruhr exports. Even in the summer months, however, the decline was not very great, and the output for the last four months of the year was only 400,000 tons less than that of the first four months. These monthly totals were as follows :

	<i>Tons</i>		<i>Tons</i>
January	10,289,000	September	9,693,000
February	9,826,000	October	9,987,000
March	10,870,000	November	9,813,000
April	9,130,000	December	10,200,000
Total	40,115,000		39,693,000

The total output for 1927 reached the astonishing figure of 118,000,000 tons. This was 6,000,000 in excess of 1926, 14,000,000 over 1925, and 4,000,000 over 1913.

The export for the year amounted to 29,000,000 tons excluding reparations deliveries. This was 4,000,000 tons less than in 1926, when British exports ceased for six months, but nearly 15,000,000 more than in 1925, 22,000,000 more than in 1924, and 5,000,000 more than the Syndicate export sales in 1913.

These results compare with a British output for 1927 of 255,000,000 tons, which was 32,000,000 less than in 1913, and 14,000,000 less than the average for 1909-13. There was a gain of 11,000,000 over 1925,

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a year of extremely bad trade and resulting crisis which was postponed by the grant of the £20,000,000 subsidy. The British exports for 1927, despite the desperate cuts in prices, amounted to 51,000,000 tons, which was 22,000,000 tons lower than in 1913, and 13,000,000 tons lower than in 1911 and 1912.

When we examine the figures relating to stocks of coal on hand, and time lost owing to bad trade, we discover equally arresting evidence of the gains from rationalisation. The peak tonnage of stocks in the Ruhr was reached in June 1925, when there remained at the mines and in the hands of the Syndicate just under nine and a half million tons. The gradual improvement in trade already noted in the later part of 1925 made it possible to reduce this by about a million tons, and during the stoppage the greater part of the remainder, consisting mostly of low grade coal and coke, was sold.

The total amount held at the mines and by the Syndicate at the beginning of January 1927 was 1,453,000 tons. The new method of concentrated production enabled the mine managers to exercise a stricter control over output, and the accumulation of excessive stocks was prevented so effectively that the total did not exceed 2,000,000 tons in the summer season.

The amount of short-time working due to bad trade gradually decreased during 1925, as the effect of closing mines and seams made itself felt. There was a sudden and heavy increase in March 1926, due to exceptional causes, and this was followed by an equally sudden and extensive fall. Then came the abnormal period of the British stoppage, and the effect of this was perceptible

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until March 1927. In January 1927 there were only 1,600 idle manshifts. There was a rise to 84,000 in March, and to 236,000 in April, this being equal to a loss of just over half a shift during the month for each worker employed. The loss of time fluctuated for the rest of the year, and in the closing months it was equal to a quarter of a shift per month per worker. This compares with an average loss of about five shifts per man per month in Great Britain at the same period.

This regularity of employment has to be borne in mind in estimating the value of wage rates. The standard of life a worker may maintain is not indicated solely by the fixed daily rate to which he may be entitled, but also by the number of days per week he is employed month in and month out. The nominal advantage of the higher British wage rates has been nullified to a serious extent by the low earnings, due to short time, of hundreds of thousands of the mine workers.

The present wages of the German workers have to be valued in relation both to the pre-war standard and to the rates paid during the period of acute crisis just before the rationalisation process began. Ruhr wage statistics are not complicated to the same extent as British figures by a multiplicity of rates and wide variations between the earnings of pieceworkers and day-wage workers. A statement of the average earnings for all classes of workers, therefore, gives a more accurate view of the position of the two categories than it does in Great Britain, where an average of 10s. a day may mean 20s. for some hewers, and 8s. for a much more numerous class of day-wage men.

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The minimum for adult workers in the Ruhr in the later part of 1927 was 7s. 10d. a shift, and the hewer's average rate was about 9s. To these rates are added small amounts for family allowances—known in Germany as the "social wage"—and an extra payment for time worked over eight hours by surface men. In specially favourable circumstances a hewer may earn up to eleven or twelve shillings a day on piece work.

From this it will be seen that the following table of actual average earnings gives a broadly accurate idea of the financial conditions of the great majority of the Ruhr mine workers, up to the wage movement of 1928, as well as a precise indication of the steady advance during the period of rationalisation.

AVERAGE EARNINGS PER SHIFT

<i>Period</i>	<i>Hewers and Assistant Hewers</i>	<i>All Workers, Above and Below Ground, including Coke Ovens and By-Products</i>
	<i>s. d.</i>	<i>s. d.</i>
1913	6 5½	5 4
1924 (January)	6 2½	5 5½
1925 (January)	7 10½	6 9
1926 (January)	8 7	7 6½
1927 (January)	9 0½	7 11
1927 (July)	9 5½	8 2½

The state of poverty into which the Ruhr workers had sunk when the mines were reopened after the French occupation is clearly shown by the earnings at the beginning of 1924, which for the hewers were actually less, in gold marks, and for all the workers only

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three halfpence per day more, than the pre-war earnings. Even at the beginning of 1925 the "real wage" of hewers, that is, the earnings reckoned in terms of cost of living, was only 5s., as compared with 6s. 5½d. in 1913.

In the summer of 1927, with cost of living about 50 per cent. over 1913, the real wage of the majority of the hewers had reached the pre-war level, and the average earnings of all the workers amounted to 53 per cent. over 1913.

In all the circumstances this was a remarkable recovery. Those who have visited Westphalia at intervals since the war have observed the rapid change in three years in the aspect of the mining towns and the appearance and demeanour of the people. Anyone now visiting the district for the first time would find it almost impossible to imagine the destitution, the passive despair of the womenfolk, the gatherings of sullen workers, and the general appearance of a desolated community which impressed a foreign observer throughout the Ruhr from the end of the war until the beginning of 1925.

How far a net saving in production costs can be gained by rationalisation must depend to a large extent on the relation between the reduction in labour cost and the capital charges incurred by the re-equipment of plant. Ill-considered expenditure on labour-saving devices may more than counterbalance the fall in the wages bill. Some mistakes are inevitable when comprehensive reorganisation is taking place at great speed, but on the whole the evidence in the Ruhr shows that

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the economies have been much greater than the new capital charges. Rising costs in the early part of 1928 were attributed mainly to higher wages, taxes, and social insurance contributions.

Precise information is not available, however, for the simple reason that wages are fixed by the ordinary process of bargaining, followed by arbitration in the event of disagreement. The employers, therefore are not required to supply such detailed information as is necessary for the determination of wage rates under the British agreements, which provide that wages and profits over a whole coalfield shall have a definite relation to each other. In the Ruhr the owners' figures of labour and other costs are often challenged by the trade union leaders.

It is freely admitted, nevertheless, that large savings have resulted from rationalisation, and the only controversial issue is whether the mine workers' share has been too small or too large. In 1925 it was admitted that between March and November, when the first effects of rationalisation were perceptible, there was an average saving of about 1s. 2d. in labour costs per ton, reckoned on the former wage scale. The effect of increases in wages, however, was to reduce this saving to less than one penny, according to statements on behalf of the owners, and they contended further that the heavier losses on the export trade, due to the British price-cutting during the subsidy period, transformed this small saving into a substantial loss. In 1926 there was no question that large profits were made, and, when normal conditions were restored in 1927, there was no serious complaint of loss until a new wage increase movement was launched.

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The Harpener Company, the largest and wealthiest of the "pure" coal concerns—that is, engaged only in coal raising, coking, and by-products, and possessing no iron and steel works—revealed the fact, in connection with the 1926 results, that the total production costs had fallen on the average from 16s. 8d. in 1924 to 13s. 5d. in 1926, although in the interval there had been a very large increase in wages. The cost per ton in 1913 was 10s. 2d. This was an increase of 32 per cent. over 1913 although the increase in wages was round about 50 per cent. The saving of 3s. 3d. per ton between 1926 and 1924 was achieved in spite of wage increases amounting to about 45 per cent. The effect of the further increase in 1927, so far as this company's operations are concerned, cannot be ascertained, as the relevant figures were not made public.

This general survey of the effects of rationalisation in the coal industry brings us to the early part of 1928, when an acute controversy arose on the ability of the industry to withstand a further increase in wages ; and what appeared to be a difficult situation for industry generally was created by an award, giving an increase of 8 per cent. and a reduction of hours for surface workers, which was made binding by the Ministry of Labour. This was followed by a sharp increase in inland prices for certain classes of coal. Immediate reactions on steel prices and transport costs soon affected the majority of manufactures.

The German Miners' Federation, acting in close association with the pacific "Christian" union, decided to give notice to terminate the wages agreement at the end of April, and to demand both an increase of 15 per cent. in wages and a reduction in working hours. The

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owners, on the other hand, declared that the increase of 1927, in conjunction with the heavier losses on export trade and the growing expenditure on taxes and social service contributions, had more than counterbalanced the savings admittedly achieved by rationalisation. They contended, therefore, that either a reduction in wages or an increase in the underground working time, to correspond with the British eight-hour day plus one winding time, was necessary if the competitive position and the output of the Ruhr industry were to be maintained.

The inevitable breakdown in negotiations was followed by the customary reference to a Government arbitrator in connection with the Ministry of Labour. The Minister of Economy also set up a Commission of five persons, with a limited reference to investigate the profitability or otherwise of the industry. The discussions at this time were characteristic of the coal industry in every country. The owners contended that wages were above the 1913 level in purchasing power. The unions held that this level had not yet been reached. When the Harpener Company disappointed expectant shareholders by reducing its dividend for 1927 from the 8 per cent. paid in 1926 to 6 per cent., while at the same time placing an unprecedentedly large amount to the depreciation fund, after meeting a heavy expenditure on re-equipment out of revenue, its action was widely ascribed to "social-political" motives, with the object of impressing the Government and the arbitrator with the case against an increase in wages.

On the surface, the balance sheets of this company and of other important groups, including the Steel

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Trust, gave no indication that the industry generally was unprofitable, apart from a number of "boundary line" collieries which were not able to engage in the coking and by-product activities, or which were situated in the least favourable areas of the older part of the southern coalfield.

The accounts dealt with in the Steel Trust balance sheet and report, which are analysed in the chapter dealing with that industry, do not show separate results for the collieries and the steelworks. The whole enterprise is pooled and regarded as a self-contained unit. The accounts of the Harpener Company, therefore, are of special importance as revealing the state of affairs in the more prosperous part of the coal industry alone. As this concern raised eight million tons in 1927, and as its results were not claimed to be greatly superior to those of the other important groups, the accounts may be taken as representative of a very large proportion of the combined coal-getting and coal-using industry.

The outstanding facts may be briefly summarised. While the output of 1927 was 80,000 tons higher than that of 1926, the number of workers fell from 28,000 to 25,000. When increased depreciation had been allowed for, the net profit was £317,000 as compared with £414,000 in 1926, after placing to depreciation the huge sum of £880,000, compared with £580,000 in 1926. The chief rationalisation work still in progress was described at the annual meeting, when the chairman, Dr. Silverberg, one of the best-known German industrialists, vigorously defended the depreciation policy against the critics. He denied that the company had adopted a policy of "self-financing," a phrase which

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has become current in Germany to indicate the enlargement of works out of revenue instead of raising new capital. He also declared that the year's income was not large enough to provide adequate reserves, that old ideas of depreciation were entirely out of date in relation to the cost and shorter life of modern plant, that tax assessment in this connection would have to be revised, and that, for a concern like the Harpener, even 2s. a ton was not enough to reckon as a working cost to provide for the maintenance of the efficiency of the plant. He suggested that it was no longer possible to estimate that buildings would last for twenty-five or thirty years, and machines for ten or fifteen years. He visualised a new era of mechanical efficiency in which replacement would be a constant necessity, and he stressed this point by reference to the fact that over 80 per cent. of the total output of the company was now obtained by mechanical means.

He frankly stated that much of the reconstruction work of the past year had been financed from the abnormal profits during the British stoppage, but against this he set a significant effect of the subsequent intense competition for the retention of the export market. It has been explained that the Syndicate's losses on export trade are pooled and shared by all the members in proportion to tonnage raised. This is done by the payment of a fixed pithead price for each class of coal whether for home or export sale. The export loss, together with the normal selling expenses, is then met by a levy on the total tonnage. Dr. Silverberg stated that the levy, which was mainly attributable to export losses, had been increased in 1927 over 1926 by $9\frac{1}{2}d.$ a ton, from $7d.$ to $1s. 4\frac{1}{2}d.$ This was

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again raised at the end of May 1928 to 2s. 2½d. per ton.

He did not profess to see any possibility of relief from this costly competition, as the effect of giving up the struggle could only be a reduction of output and increased unemployment.

He declared that the continuance of the rationalisation plans would depend on the general situation, but, from the facts given later in the meeting, it was clear that large commitments already entered into cannot very well be abandoned. Before the era of rationalisation the company was producing coal at twenty-one shafts, thirteen having coking and by-product plants. In three years six shafts had been closed, and the latest phase of rationalisation—the re-organisation of the underground workings to economise in transport, timber and steel supports, and non-productive stone-cutting work, was making such progress that two more shafts would be closed within the next two years, and within five years there would be only eleven instead of twenty-one in operation. Moreover, several of these would be new shafts, placed in the most economical situation.

Apart from the immense savings in the maintenance of surface works implied by this revolutionary change, the rationalisation programme included the reconstruction of all the coking plants on a concentrated plan. The works already in hand included two of these new cokeries, one of which will have a daily output capacity of two thousand tons, and within two or three years the company will have only four or five of the newest cost-saving central plants instead of thirteen. So far, this work has been done without raising new capital, and

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the large amounts, set aside for depreciation suggest that the whole programme will be carried through on the same basis.

The Commission reported in April. Dr. Schmalenbach, the chairman, and three other members (two of whom were closely associated with employers' interests) presented a majority report, and Dr. Baade, an expert associated with Labour interests, expressed in a minority report dissent from the main conclusions of his colleagues. The question of depreciation, regarded as a working cost, was the dominant theme of both reports. The gravity with which the Commission discussed the issue whether 1s. or 2s. a ton ought to be written off might well excite a curious interest among the majority of British mining directors, who are much more concerned with calculating losses than with such an issue.

The attention given to the matter in these reports, however, does indicate the importance attached in German industry to prudent finance, and to the need for maintaining equipment at the highest level of efficiency. The Commission examined closely the accounts of a small number of mines, placed in three categories, described in relation to prosperity as good, fair, and bad. This analysis disproves completely the statement frequently made in this country to the effect that the German costs other than labour are several shillings a ton higher than in Great Britain, although it would not be surprising if this were so, having regard to the high degree of mechanisation both underground and at the surface, and to the extensive and costly surface buildings and equipment which have to be maintained. In Great Britain labour costs are 68 per

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cent. of the total production expenses. The German Commission found that, without depreciation, labour costs were 56 per cent. of the total, and with depreciation 50 per cent.

In November 1927, the average cost per ton of raising coal at one group of mines was, without depreciation, 13s. 8d., and the wage cost per ton 7s. 8d., while the proceeds amounted on the average to 14s. 2½d. The average wage cost per ton in Great Britain was 10s. 0¾d., out of a total of 14s. 10¼d. The German cost for stores, timber, power, and so on was 3s. 6d., as compared with 1s. 9d. in Great Britain, while taxes, social insurances, and other services in Germany cost 2s. 7d. per ton, as compared with 2s. 6½d. in Great Britain for these charges plus salaries, repairs, office and general expenses, and depreciation. Salaries, shown separately in the analysis, amounted to 11d. per ton in Germany. This statement that taxes and social services are such a heavy burden on the German industry will no doubt surprise many people who have been led to believe that German industry is escaping with relatively light charges under this head.

The above figures have not been given with the intention of suggesting a precise comparison of costs—which is impossible when conditions vary widely—but simply to convey a general impression of the proportions of the more important charges, and particularly of the effect of rationalisation on wage costs per ton. A detailed study of this point in the report brings out some highly significant facts. In 1913, with average earnings per shift of 5s. 7d., the labour cost per ton was 5s. 11½d. In January 1925 the earnings were 6s. 8d., and the labour cost 7s. 5d. In December

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1925 wages had increased to 7s. 5d., and the wage cost per ton had dropped to 7s. 2d. In July 1926 the figures were 7s. 6d. earnings and 6s. 6d. wage cost. In January 1927 they were 7s. 9d. and 6s. 10d. and in December 1927 earnings had risen to 8s. 3d., while the labour cost per ton was 7s. 2d.

From this it will be seen that, if the 1925 ratio of daily earnings to wage costs per ton had been maintained, the labour cost per ton in 1927 would have been 9s. 2d. instead of 7s. 2d., so that a saving of about 2s. per ton under this head may be attributed to rationalisation. The main interest for British miners in this comparison lies, however, in the fact that, while the labour cost per ton in Great Britain in the latter part of 1927 was 2s. 10½d. more than the German, the average earnings per shift were only 1s. 4½d. more. If, therefore, a comparable saving in the labour cost per ton were effected in the British mines through rationalisation, a substantial increase in the daily earnings would be possible, apart from the advantage of full-time working for those left in the industry after a concentration of production had taken place.

Attention has been given to the above figures because of the emphasis laid by the majority of the German Commission on their contention that a much larger amount should be allocated from revenue to depreciation as a working cost, the definite implication being that this should have preference over any further increase in wages. Following an earlier inquiry by officials of the Ministry of Economy the Ministry had expressed the opinion that 1s. 3d. a ton was a reasonable amount to allow for depreciation. The Commission majority declared firmly that this was too low, and that,

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taking the average conditions into consideration, the allocation should be not less than 1s. 9d. The main argument in support of this contention was the same as that used by Dr. Silverberg ; that modern plant, apart from being more costly, would need replacing more frequently if full efficiency were to be maintained.

The Commission had to face the fact that, in practice, many of the companies had been in the habit of writing off even less than 1s. a ton, and had still managed, somehow or other, to carry through important improvements in equipment, and meet at least part of the cost out of revenue. The majority declared, nevertheless, that this was bad practice, and that if a sound financial principle were adopted the amount written off would be substantially increased. By the same reasoning the profits shown by these companies in 1926 and 1927 were held to be unjustified. On the other hand, the amount written off by several of the more important groups, exceeding 2s. in one or two instances, was admitted to be superabundant.

The general opinion of the majority was contested with equal vigour by Dr. Baade, the minority member, who argued that 1s. 1d. per ton was an ample allowance to preserve the property at its existing value, which he declared, was the only legitimate function of depreciation. If the object was to replace the existing equipment by more costly works and plant, or to extend the works, there should be an increase in capital by the ordinary means to cover the margin between the actual cost and the provision for legitimate depreciation.

The application of these respective views to the financial position of the colliery groups whose accounts

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were investigated resulted in the following conclusions, which should be related to the serious situation in 1924, when very heavy losses were recorded, for the most part on the basis of the depreciation allowances which the Commission majority held to be inadequate.

Taking the average of all the accounts the majority found that, when depreciation was allowed for at the rate of 1s. 9d. a ton, there was a net loss on coal-getting of 1s. 3d. The net profit of 4s. 6d. per ton of coke produced, reckoning the cost of the coking coal at the pithead prices fixed by the Syndicate, worked out at 11½d. per ton for all the saleable coal raised, and the profits on the briquetting works averaged just under one halfpenny on the total output. With these profits brought into the accounts, therefore, a net loss of 3d. per ton was arrived at.

Dr. Baade, on the other hand, found that, after taking the coking, by-products, and other profits into account, and before allowing for depreciation, there was a profit of 1s. 7½d. per ton. After allowing 1s. 1d. for depreciation there remained an average net profit of 6½d. He expressed the opinion that the position of the "boundary line" collieries should not determine wage or price policy, and that neither an endurable increase in prices nor the arrest of wage development could place these mines on a sound profitable basis. The solution of the problem, so far as these mines were concerned, was the continuance of rationalisation and of absorption and closing down, so that the underground workings could be re-arranged and exploited to better advantage.

Having regard to these two reports, general astonishment was expressed, except in labour circles, when the

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award of the arbitrator was issued almost simultaneously. It conceded a general increase of 8 per cent. on the shift rates, as well as an immediate reduction of one hour in the working time per shift of those immediately concerned with the raising of coal, bringing them down to an eight-hour day. Other surface workers were to have their time reduced to $9\frac{1}{2}$ hours with an 11 hour shift, and, from August 1928 to 9 hours with a 10 hour shift.

The award contained a clause without precedent in such documents. Under normal circumstances it was to run for twelve months, but, if the prices of inland coal were raised before the end of that period, one month's notice could at once be given to terminate the agreement and seek a fresh wages revision. The inference, which appeared to be confirmed by later events, that a difference existed between the Ministries of Labour and Economy on this matter, was naturally drawn from this novel provision.

In accordance with custom both sides formally rejected the award, but the discontent which found expression was immensely stronger on the owner's side. It was maintained that the cost of the award would be over a shilling per ton, with the result that both an increase in inland prices and a further contraction of the industry would be necessary. The nature of the award was freely ascribed to political considerations in view of the coming election, and this was asserted still more energetically when, after consideration by the Government as a whole, the Ministry of Labour gave legal effect to the award by making it binding.

The Syndicate immediately applied for permission to increase prices, and the Minister of Economy

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accepted a majority decision of the National Coal Council to the effect that the Syndicate should be allowed to raise prices within its own discretion, on condition that the revenue from the increases did not exceed the aggregate yield of 1s. per ton on the total output.

This enabled the Syndicate to put an extra charge of as much as 2s. or 3s. per ton on the classes of coal which were in greater demand in the inland market, and which were more or less secure from foreign competition. It also became known that the Syndicate contemplated, for a time at any rate, withdrawal from the export market in certain areas where the price-cutting war imposed the heaviest losses, with the further intention, no doubt, of re-entering the fray at a later stage if the withdrawal had the effect of increasing prices in these areas.

In accordance with this policy, and in anticipation of some shrinkage of the home market in consequence of the price increases, notice was at once given to about 3 per cent. of the mine workers, and it was suggested that further dismissals might be necessary. The steel firms also announced that prices would be increased, and the State Railway Company applied for reconsideration of a demand, which the Ministry of Economy had formerly rejected, that higher charges should be permitted.

Among the workers these measures were regarded as to some extent retaliatory, and intended to convince the trade unions that if wage demands were pressed too hard the workers were bound to lose any advantage in nominal wages by a rise in general prices which would reduce the "real" wages. While it was assumed that

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the two sections of the Government, represented respectively by the Ministries of Labour and Economy, differed on policy, the opinion was expressed by some people that the real object of increasing coal prices was to spread over the community as a whole the burden of the heavy losses incurred in maintaining the export coal trade in face of the severe world competition.

Whether the rise in prices will check the marked recovery throughout German industry during 1928, or whether it will bring about a speeding up of the rationalisation measures still possible on a large scale, time alone can show. The situation at the moment is too obscure to permit of the expression of any positive opinion, but the course of events will be well worth close study, especially in relation to the pace at which wages can be increased during rationalisation without checking or entirely stopping the flow of benefits from that process.

CHAPTER III

VAST CHANGES IN STEEL PRODUCTION

In the iron and steel works of Germany, we have an example of rationalisation in an industry which is half trustified and half controlled by four or five of the large concerns which have so far maintained an independent existence. The scope for economies and improvement in efficiency was even wider than in the coal industry of the Ruhr. The process was also more complicated, and the task of reconstruction has not yet been completed, although remarkable progress has been made in less than two years, and notable results have been gained.

In the coal industry, given the necessary preliminary grouping of mines to form big-scale units of production and administration, together with the will to overcome difficulties, it was a relatively simple matter to devise the rationalisation measures. The most economical production of coal and the most remunerative use of it at the pithead were the principal objectives, combined with effective regulation of output in accordance with the market demands.

In the iron and steel industry the same principles held good, but the methods of applying them had to be adapted to more diverse conditions and to a greater variety of purposes. Among the wider considerations to

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be taken into account were the extensive range of products, standardisation, specialised production in particular works, the elimination of waste in the transport both of raw materials and finished goods, the allocation of output in relation to the market to be served and selling arrangements, as well as the closing of obsolete or inefficient works, and the concentration of production in the most modern and highly mechanised plants.

For the fullest attainment of these aims the greatest measure of centralised control, *within the limits of efficient management*, was clearly indicated. This consideration led to the formation, in the spring of 1926, after long negotiations, of the United Steel Works Company (Vereinigte Stahlwerke A.G.). This concern, which controls about 40 per cent. of the total German production of iron and steel, prepared without delay a comprehensive programme of rationalisation, and proceeded to carry it out with a characteristically German intensity of purpose. The Krupps concern, after taking part in the preliminary discussions, decided to remain outside while co-operating generally on matters affecting policy and prices. Five other big firms which were also asked to join the Trust decided to remain independent, but they are associated with it and with Krupps in the general cartel arrangement for the rationing of production. These firms were Kloeckner, Hoesch, Mannesmann, Gutehoffnungshütte, and Stumm, and, as in the case of the firms in the coal industry, they were working on a scale large enough to enable them to apply the main principles of rationalisation within their own domains. At a later stage the Trust acquired a large interest in the Stumm concern.

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Already before the war the German iron and steel industry was highly organised in large units, and, notwithstanding the usual difficulties, arrangements had been devised for the control of output on the quota system, operated by central cartel organisations. There were two territorial syndicates for the iron smelting section. The Westphalian Syndicate simply regulated output, and the constituent firms disposed of their own products, while the Silesian Syndicate acted as a selling agent as well as an output quota-fixing body.

In the steel section the principal organisation was the Steel Works Union, with impressive headquarters in Düsseldorf. This body, which was established as far back as 1904, regulated production and sold certain specified products, leaving the affiliated firms to sell the others. By 1914 this Syndicate controlled the output of works with a combined capacity of well over twelve million tons of steel products. A syndicate for the Silesian area operated in a similar manner, but on a much smaller scale, and there were subsidiary syndicates for specialised goods, such as wire, pipes, screws, and foundry products. On the distributing side there were also powerful associations of merchants for price-fixing, in so far as this was not controlled by the syndicates of producers.

Effective action for the regulation of output can be taken only by a limited number of owning groups. If there are many concerns, some with up-to-date and others with obsolete plant, the quota system is either unworkable or it creates constant friction and difficulty. Therefore, the success achieved on the whole by the Westphalian Steel Union indicates the advance made

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in Germany during the forty years before the war along the lines of unification by the growth of powerful controlling groups. In the early seventies there were nearly two hundred and fifty separate ironworks and just under four hundred blast furnaces, the productive capacity of the majority being exceedingly small by comparison with the most modern furnaces now seen in the Ruhr. Just before the war there were only one hundred works and just over three hundred furnaces. In the interval the total production had increased enormously. Taking the whole of pre-war Germany, the increase in the production of pig-iron between 1900 and 1914 alone rose from 7,500,000 tons to 16,700,000 tons.

There were similar technical developments to meet a rapidly expanding trade in the steel section of the industry. If, therefore, rationalisation is but a new-fangled term to describe an old process of combination and the elimination of competition it had been carried out pretty thoroughly before the war. That it is, in fact, something widely different has been made clear in the survey of the application of the method to the coal industry. The distinction is brought out even more sharply when we examine the conditions and developments in the iron and steel industry after the war.

When the stage of upheaval, military occupation of the Ruhr, paralysis of production, and financial confusion came to an end the iron and steel firms found themselves in the same position as the colliery companies. Productive capacity had been increased during the war to such an extent that without Lorraine, the Saar, and two-thirds of Upper Silesia, the combined output capacity was greater than that of the whole of

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pre-war Germany. The difficulty occasioned by the loss of important ore-bearing territories had been overcome by the organisation of supplies from Sweden, Spain, and other centres, and by the adaptation of the plant to the different qualities of these ores, but the general trade conditions remained serious, as the following figures show :

PRODUCTION OF IRON AND STEEL

<i>Year</i>	<i>Iron</i> <i>tons</i>	<i>Steel</i> <i>tons</i>
1913 ¹	11,000,000	12,300,000
1920	6,300,000	9,200,000
1922	9,100,000	11,700,000
1923	4,900,000	6,300,000
1924	7,800,000	9,800,000

The year 1924 was a period of crisis, similar in character to that in the coal industry. Liquid capital had disappeared, and credit was intolerably dear. Costly plant designed for uninterrupted operation could not be worked full time. The rationing of production, which had produced beneficial results under the pre-war conditions of constant expansion, now added to the burden by increasing the ratio of overhead charges to actual output. In the pre-war evolution of the industry, with demand steadily increasing, and a sure market at profitable prices, the producing firms could extend their works and duplicate plants without considering intricate new methods of organisation necessary when the extreme limit of economy has to be attained. There was no pressing reason why production should be

¹ Present German frontiers, excluding Saar.

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highly specialised and carefully allocated to particular works for particular purposes. There were large rolling mills, for instance, where several kinds of products were turned out, necessitating frequent stoppages of the plant for adjustments. In all these respects the conditions in Germany were similar to those still existing in Great Britain. In the technical equipment of the works a greater advance had been made in Germany, owing to the better pre-war financial resources of the larger German concerns, but the essential principles of rationalisation had not been applied or even thought out. The need for it as the most effective method of carrying big-scale industry through periods of acute difficulty, due to extreme fluctuations of the market, was only realised when the dividing line between complete breakdown and recovery from the shocks of 1920-4 was a very narrow one.

The belief is widely held in this country, and is even supported in official documents published as late as 1928, that Germany's industrial recovery is largely due to the elimination of debts and the re-equipment which took place during the inflation period. It has already been pointed out in reference to coal that the advantages of debt and mortgage liquidation were nullified by the subsequent shortage of capital and dear credit. As to re-equipment, this actually intensified the difficulties during the months of reduced demand by widening still further the gulf between productive capacity and consuming power. Recovery is attributable to several causes, but, in so far as progress could be determined inside the industry, it was due entirely to the rationalisation after 1924. A general revival in the trade of the country certainly helped to produce

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the best possible results from rationalisation, but it should be noted in this connection that the reorganisation which was carried out simultaneously in all the important industries, largely with the aid of loan capital, contributed to the general revival. What was done in each industry reacted favourably on the others. The low prices of coal quoted in 1924 in a desperate effort to stimulate trade could not have been maintained if the production costs had not been reduced subsequently by rationalisation. The cheaper fuel, in turn, was of immense benefit to the iron and steel industry during the critical year of 1925. Moreover, the general process of re-equipment created an enormous demand for machinery of all kinds. These stimulating reactions in the aggregate started an upward spiral movement, which lifted industry as a whole from the conditions of stagnation and acute difficulty. The increases in wages, which the workers in the heavy industries gained as production costs fell, augmented purchasing power to such an extent that a rapidly rising tide of demand for general commodities gave an impetus to miscellaneous trades all over the country.

To the causes of the crisis of 1924-5 already mentioned must be added the spectacular collapse of the "vertical" trusts, which had been developed, principally by Hugo Stinnes, during the feverish period of inflation. In the confusion and uncertainty of this time, the pre-war cartel organisations, which had regulated production, controlled prices, and provided for the centralised sale of many products, had been dissolved. Only the Pig-Iron Association maintained its existence, for a time precariously.

In place of this ordered regulation of the operations

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of the whole industry there was seen a movement, dominated by one or two powerful personalities, for the establishment of a new form of trust organisation, in which all stages of manufacture and transport, from raw material to finished article, should be included. Stinnes, whose organising genius has never been questioned by his sternest critics, was the outstanding figure in this movement, and his own vertical trust may be taken as the typical example of the structure, defects, and failure of the method.

By a series of bold manipulations he brought under one financial and policy control a vast conglomeration of coal, iron and steel, various branches of general and electrical engineering, shipping, and miscellaneous trades. This unprecedented combine, known as the Siemens-Rhein-Elbe-Schückert Union, was not only the most impressive but the most solidly based of the vertical trusts. Yet it could not stand against the disintegrating effects of the financial crisis which followed the stabilisation of the currency. The collapse and subsequent readjustment into separately controlled concerns might not have been so spectacular or complete if Stinnes had lived, but those who were most intimate with the affairs of the organisation do not believe that it could have survived in any event without some measure of separation of the constituent elements.

Coal and iron and steel combinations, with essential transport and shipping, can be firmly maintained, but, beyond this, the more diversified the type of undertakings which are brought under central control the greater the risk of loss of efficiency in administration and management. The case of Krupps is entirely exceptional. Their Essen works have been evolved

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slowly over a long period. To the basic production of coal, iron, and steel has been added one manufacturing activity after another, but each extension has been determined by the results of past experience. When, therefore, the firm was confronted after the war with the necessity of transforming its armament departments into factories for the products of peace, the accumulated experience of generations was available. The structure of the Krupps concern is that of a vertical trust, but its family traditions, highly-developed machinery of management, and concentrated organisation place it in a separate category from the mushroom vertical trust growths of the inflation period.

While these outwardly impressive industrial structures were breaking up, movements to re-establish the pre-war cartel method of control, and to restrict competition still more effectively by the promotion of "horizontal" combinations—that is, the merging of works turning out similar products—were gathering strength. With the pre-war tradition so deeply implanted it was natural that the first efforts to remove the difficulties of the crisis were directed to renewed output control and price-fixing. Low wages and long working hours had failed to mitigate to any material extent the seriousness of the situation. The two-shift system was in operation, and the wage rates gave an income to the workers much below the purchasing value of the pre-war wages.

Towards the end of 1924, therefore, the Ingot Steel Association was formed—after delicate negotiations on quota allocations—for the main purpose of regulating the production of raw steel. Price-fixing was complicated by the competitive advantages enjoyed at this

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time by the French and Belgian manufacturers, owing to the state of the currencies. To counteract these advantages as far as possible, a scheme for the payment of bounties to encourage the German finishing trades working for export to use the home product was arranged by the Ingot Steel Association.

Little experience of the working of these measures was needed to show that, efficacious as they had been before the war, they would not provide an adequate solution of the post-war problems. There was soon talk of attempts to extend the cartel organisation internationally, and this tendency was fostered by the rapid re-establishment of subsidiary associations for the control of specialised sections of the industry and for merchanting. By the spring of 1925 this form of control had been restored on almost as comprehensive a basis as before the war, and, within a few weeks, associations were formed to regulate the production and prices of semi-finished products, pipes, wire, railway materials, and plates.

It was not long before discussion of the problems of the industry passed beyond the idea of loose cartel combination to that of trustification. The fact that the steel and iron quotas at this time had to provide for a curtailment of production, amounting to about 40 per cent. of the capacity of the plant, caused it to be realised that, sooner or later, serious difficulty would arise in those works which had been equipped in such a manner that profitable operation was only possible with full-time working, or something very near to it. It was provided in the regulations of the Steel Ingot Association, therefore, that quotas could be sold outright or transferred temporarily. By this means one

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firm could dispose of part of its quota to another more favourably situated, and close down the works incapable of standing the competitive strain ; or temporary arrangements might be made between two concerns for a quota transfer to enable one or the other to surmount a particular difficulty.

By these various measures the industry managed to struggle through 1925, exhibiting a paradox, which puzzled most expert observers, of rising production and increasing financial embarrassments. A production of twelve million tons of raw steel and ten million tons of pig-iron was attained, and the achievement was justly regarded as a remarkable one in the circumstances. Nevertheless, the principal difficulties remained. The sale of quotas, in so far as it was resorted to, merely touched the fringe of the technical problems. In the pig-iron section only eighty blast furnaces out of just over two hundred were in commission. In the ingot steel and working-up sections each firm could only operate part of the plant in which continuous working was necessary, and the shops which could be run intermittently were on short time. In these circumstances high overhead costs per unit of production could not be avoided.

The special difficulties of Krupps, arising from the wide range of the manufacturing changes that had been necessary, from several failures to achieve success in the new departments, and from the general depression in trade, were so great that the number of workers at Essen gradually declined from over 40,000 in 1920 to only 18,000 in the early part of 1926. The directors and managers of this huge self-centred undertaking, however, were tackling their problems with intense

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energy and courage. Loans were raised for reorganisation and re-equipment, and between 1925 and 1927 a comprehensive scheme of rationalisation was carried out at the Essen works and the allied establishments in other parts of Germany. Fuel costs were reduced by rationalisation of the firm's coal-mines. The installation of the latest coal-washeries, coking, and by-product plants brought down labour costs with a sharp jump. Production of pig-iron was concentrated in the most efficient furnaces mechanised to the last degree, and the cost of transport of coke from the ovens to the furnaces was substantially reduced by the use of fifty-ton waggons (supplied specially by the State railway), which were mechanically loaded at the ovens and automatically emptied at the furnaces. •

The older steel furnaces and workshops at Essen were scrapped, and the new buildings erected during the war—two of them having a roof span of nearly twenty acres—were equipped for specialised production. Those ventures into new fields of manufacture which had been only partially justified were liquidated, and intensive effort was directed to the attainment of success in the departments which gave greater promise of profitable operation. As a result of this dynamic effort, and the consequent reduction of working costs, the corner was gradually turned, and by the end of 1927 the number of workers at Essen had again risen to over forty thousand.

The problems of the other firms and combines in the industry were different in character and scope. During the early part of 1925, those who were responsible for control and management anxiously surveyed the whole field before deciding on the action to be

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taken. The need for rationalisation was realised, but the question was how to apply the process most effectively. The extent to which each concern could take action was limited, as the circumstances differed widely from those of Krupp. Only by concerted plans on a big scale could some of the major causes of loss and waste be removed.

The first suggestion of fusion did not evoke an encouraging response, and in the discussions on the subject the obstacles were represented as so formidable that some looser form of combination than complete amalgamation was advocated as more easily attainable, if less desirable. Among the older men, who had led the way in the technical development and big-scale organisation of the industry, the rugged personality of Thyssen stood out as a sturdy defender of the older form of organisation, who was gradually convinced of the need for immense changes.

As the situation was more deeply studied, the conviction gradually gained ground that only by a big combination, with a strong centralised direction, could the desired aims be attained. The broad picture presented by a survey at this period indicated both the intricacy of the task of reconstruction on the lines mapped out, and the impossibility of carrying it out fully and successfully without the creation of a central authority, which should possess wide powers of administrative and technical control.

The protracted discussions, and the reluctance of some of the most influential leaders of the industry to surrender the independent control of the technical organisation of their own works, which had always been maintained under the cartel system, disposes of any

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suggestion that the object of the formation of the Trust was merely the acquisition of monopoly powers to strengthen the producers against the consumers. Whatever development of policy may take place in the future, the impelling aim at the beginning of the movement was the reduction of oncosts, to avoid a steep rise in prices and to stimulate demand, so that all the efficient works could be operated as nearly as possible to full capacity. It was the pressure of circumstances, particularly of financial difficulties, which compelled the adoption of the final solution of partial trustification.

That it was not adopted simply for the sake of forming a powerful combination, but as a means to an end already broadly planned, is evident from utterances of some of the leading men who were responsible for the movement and its culmination. The head of the Phoenix concern gave a candid account of the plan, which was, in effect, a terse explanation of the principles of rationalisation as it was intended to apply them to this particular industry. The participating firms, he declared, were convinced that substantial economies could be achieved by reducing production costs through re-organisation on the following lines :

Production in the least possible number of works, those chosen being the best fitted from both the technical and commercial points of view.

The arrangement from the central control office of all movements of material between one works and another, with the object of eliminating unnecessary transport charges.

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Economy through standardising new plant and uniform simplification of equipment.

Financial simplification, and the reduction of cash balances to a much smaller sum than it was necessary for the separate undertakings to carry.

The inevitable closing of works and displacement of labour was justified on the ground of necessity, but a promise was given that everything possible would be done, by transference of labour to the works left in production, and by re-employment at the earliest opportunity, to limit the hardships involved in the preliminary changes.

The head of the Rheinstahl concern defended the decision to bring about a complete fusion on the ground that the problems could not be solved, and the necessary restriction of production with lower production costs could not be achieved by means of a working arrangement.

The cartel system had, in fact, failed to carry the industry through a crisis caused by surplus productive capacity in relation to demand, and more drastic measures were necessary for its preservation. This was the conviction which finally broke down the reluctance of the men of the older school to merge the concerns built up by intense individual effort, and to share the powers of control they had exercised for so long with an independence almost unchallenged.

The Trust was formally constituted in May 1926, at the end of negotiations and investigations lasting about ten months. If the full scope of the rationalisation which followed is to be fully realised, it is necessary to give

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some indication of the magnitude, variety, and geographical situation of the works which were absorbed. The firms which entered the combination were the Thyssen, Rhein-Elbe Union (embracing the most important coal and iron undertakings in the disintegrated Stinnes vertical trust), Phoenix, and Rheinstahl. It was, therefore, in the main a Rhine-Westphalian organisation, but its inter-locking connections with concerns in other parts of Germany, and with certain foreign enterprises, were subsequently extended. Krupps had actually taken part in the preliminary negotiations, and withdrew primarily on account of family interests, but the other four companies, already mentioned as remaining outside, declined at the outset an invitation to be associated with the fusion project.

The initial share capital was £40,000,000, with an additional £6,000,000 bonus shares issued in respect of certain special assets taken over. By the method adopted for the allocation of the shares and for the control of the Trust the participating concerns became, in effect, holding companies, and the directors of the Trust were appointed, not directly by the shareholders, but by the boards of these companies. The share capital was quickly augmented by huge loans, drawn mainly from the United States, to be expended on reconstruction and development.

The principal works and mines taken over were distributed widely throughout Westphalia and the Rhine Province—that busiest industrial region of Europe, bounded by the Rhine on the west and extending northward from Cologne to beyond Dortmund, an area fifty miles long and over twenty wide.

The Rhein-Elbe Union contributed, among other

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establishments, large mines of the old Gelsenkirchen and Deutsch-Luxemburg colliery companies, with operations covering a big area in the central and eastern section of the Ruhr coalfield ; and great iron and steel works in the Bochum district. The vast concerns of the Thyssen group, concentrated mainly in a wide region of the Rhine Province, north of Hamborn, included some of the best equipped and most skilfully organised mines and metal works in Europe, possessing great advantages by reason of their proximity to the great shipping river. The Phoenix concern brought into the combination mines and works just north of Duisburg, near the harbour of Ruhrort ; and iron and steel works in the districts of Dusseldorf and Cologne. The coal-mines of the Rhine Steel Company were excluded owing to the fact that the Chemical Trust had acquired an interest in them, but all the iron and steel, ore, limestone, and other mineral undertakings of this group were incorporated.

The range of activities of the Steel Trust, therefore, included coal-mining, coking, by-products, and various other subsidiary enterprises at the mines ; blast furnaces, ore-mines, in Germany and abroad, quarries, steel-furnaces, foundries, and rolling- and tinplate-mills. The steel quota of the Trust in the Ingot Steel Association was 42 per cent. in 1927, in which year its production was nearly seven million tons. The production of coal by the Trust in 1927 was 26,000,000 tons, or, roughly, one quarter of the total production of the Ruhr.

That is to say, this one combine, formed specifically to make possible a comprehensive technical rationalisation, is of such magnitude that its output of raw steel

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in 1927 was almost as great as that of the whole of the industry of Great Britain, while its coal production was equal to just under one-tenth of the total British output. It controls nearly 70 per cent. of the production of semi-finished goods in the German industry.

The impressiveness of this picture of industrial concentration for the purpose of cutting out waste, increasing efficiency, achieving the highest possible limit of mechanisation, and regulating production on a low cost basis, is heightened when subsequent inter-locking combination movements are considered. The most important of these was the acquisition at the end of 1926 of one quarter of the shares in the Central German Steelworks Company, formed by a fusion of certain works belonging to the Trust, and the Lauchhammer iron and steel works of the Linke-Hofmann-Lauchhammer Company. The quota of this combine in the Ingot Steel Association was 700,000 tons in 1926. The Linke-Hofmann Company was also closely associated in a new merger of the principal German Silesian iron and steel works, with associated coal-mines. The Westphalian Steel Trust further acquired complete control of, or a substantial interest in, other important works, including an iron company in the Siegen district, iron and steel works of the Stumm concern, and the establishments of the German Special Steels Company at Bochum and Dortmund.

Altogether there passed into the control of the Trust nearly one hundred blast furnaces, one hundred and fifty furnaces in the steelworks, and forty-eight collieries with one hundred and sixty shafts.

By 1927 this gigantic concern was working with share and debenture capital, loans, and reserves

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amounting altogether to £87,000,000, against which was set material assets valued at £90,000,000. The ordinary reserves were £4,000,000; there was a special reserve of just under £5,000,000 for renewal of plant, and the characteristic conservative policy of allocating several million pounds each year from profits for depreciation was adopted. The advantages of simplified financial arrangements and the economies resulting from the elimination of numerous balances necessary for the separate concerns were realised immediately. •

With a centralised control of general policy, combined with a large degree of executive autonomy within the limits of that policy in the administration and direction of each group of works or mines, it became possible to proceed swiftly with the execution of the technical reorganisation plans. The task will never be fully completed, since the general policy implies a continuous adaptation to changing circumstances, but, within two years from the formation of the Trust, what may be described without exaggeration as a revolution in productive methods and directive administration was carried through. The speed of the accomplishment is in itself adequate evidence of the precision of aim which characterised the preparation of the scheme, and of the concentration of purpose and dynamic energy with which the rationalisation ideas were translated into action.

It is only possible here to indicate broadly the lines followed in planning the comprehensive changes which affected almost every detail of organisation and production in the diverse and widely-scattered works. In certain districts there were neighbouring plants

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which had been operated independently under the regime of separate ownership. These were combined with the object of cutting out every duplicated activity. Overlapping departments were closed down. The less efficient equipment and buildings were scrapped. Administration and technical direction were concentrated. Specialised production was allocated to each unit of plant maintained in operation, and, where necessary, re-equipment to attain the highest limit of labour-saving was provided for. In this way establishments which had been regarded as highly efficient when operated separately were relieved of costs which became unnecessary in a single organisation, apart altogether from the economies and increased efficiency resulting from the wider changes which fitted the combined plants into the general scheme of production throughout the whole domain of the Trust.

It would lead too deeply into the technical field to attempt to give a detailed description of these wider changes, but their nature and scope can be indicated. It was provided that, wherever possible, a particular works should be engaged only on specialised production for which its equipment and situation were most suitable. For instance, rolling-mills which had been turning out a variety of products were limited to one, so that the loss of time and expense owing to frequent changes of rolls might be avoided. Uninterrupted and standardised production of rails, bars, plates, and so on, with the mills running at full capacity and at minimum cost, thus became possible.

The part to be played by the blast furnaces, as well as the working-up departments and steel works, was also re-arranged to serve two main purposes. One was

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the concentration on particular products at full-time working. The other was the supply of goods for particular markets at the lowest possible transport costs. With this object the Thyssen, Phoenix, and Rheinstahl works in the western area, and particularly those near the Rhine, were organised for the sea-borne export trade. Production for rail-borne export across Germany, and for the inland market, was allocated to the works most favourably placed for the purpose. It was found necessary and profitable, for the successful application of this plan, to close down altogether certain works which were badly placed in relation either to the supply of raw materials or the distribution of the products, and to extend, as well as re-equip, those works which could be operated most economically. Coke oven reconstruction was also undertaken, and the fact that about this time the leading German oven and by-product plant manufacturers had worked out notable improvements stimulated this part of the rationalisation process.

At first there was a suggestion that huge central coking plants, capable of producing up to 6,000 tons a day, should be constructed, but mature consideration led to a modification of this plan, and it was decided to construct smaller works, producing from 1,000 to 2,000 tons daily, at the most convenient and economical points. All these new plants were of the extreme labour-saving type already mentioned in the chapter on the coalfields reconstruction.

Already great progress had been made in fuel economy in the works of the constituent firms, but it now became possible to advance still further. In the iron, steel, and associated works the continuous process from blast furnace to rolling-mill, with the metal

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passing from stage to stage without cooling, was already in operation in respect of more than half the steel goods produced. It was now rapidly extended by the re-arrangement of production in the works taken over by the Trust, and by the new construction and re-equipment programme. The greater use of blast furnace gas, for purposes which, liberated larger quantities of surplus coke oven gas for profitable sale through the long-distance supply organisation, added still more to the immense saving in fuel costs which was achieved by these various means.

On the commercial side far-reaching changes in organisation were also brought about. The sale of the various products was centralised through subsidiary merchanting bodies or departments of the specialised groups of works. By this means the distribution of the goods is controlled much more efficiently, production can be regulated in accordance with demand with much greater facility, and in the aggregate a very large saving of unnecessary intermediate profits is realised.

Not less important was the economy achieved by bulk purchases of materials, and the formation of a subsidiary company for the organisation of the "scrap" market, with the object of eliminating speculation in this important commodity. The pooling of all the separate resources for scientific and technical research cut out much duplication of effort, and made possible an extension and intensification of this work without increasing the cost.

The administration was arranged so as to avoid in every possible way the risk of inflexibility of bureaucratic control and the discouragement of initiative. It has been mentioned that, within the limits of the

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general policy laid down by the central executive of the Trust, a large measure of autonomy in the management of the groups of works was provided for, and this distribution of administrative responsibility was facilitated by the formation of definite productive units, each with its special tasks to perform.

The forty-eight collieries, for instance, were divided into four territorial groups, with the administration directed from four centres : Bochum, Gelsenkirchen, Dortmund, and Hamborn. Under this system the chief mine directors, engineers, chemists, and coke oven and by-product managers have just as wide a scope for the exercise of initiative as if they were employed by one of the other colliery companies.

The supply of materials is organised from a department in Dortmund, and its chief director is responsible for the management of the ore-mines, quarries, and associated works in Germany, Spain, Sweden, and other countries. In the grouped productive works there are executive directors endowed with authority and responsibility in varying degrees, according to the nature of the operations. With this method of organisation the central staff tends to be a co-ordinating body rather than a governing autocracy, and the general effect of the division of administrative authority is to foster a healthy kind of competition in efficiency between the various group management units.

CHAPTER IV

A RECORD OF RECOVERY

In attempting to measure the results of rationalisation in the iron and steel industry it is not possible to arrive at such definite conclusions as in the case of the coal industry, so far as the workers are concerned. In Germany, as in Great Britain, the statistics relating to coal are much more detailed and precise than those furnished in respect of the other heavy industries. Some indication of the effect of rationalisation is afforded, however, by information drawn from various sources.

The Steel Trust has maintained reserve about the precise savings in production costs accountable for by reorganisation, but it is admitted broadly that these have been substantial. Not only has the total output been heavily increased, but it has been achieved with proportionately fewer men than would have been required under the old regime. In the first year's working, for instance, the production of the Thyssen plant was doubled without any increase in the number of men employed.

In the early months of reorganisation there was the same process of displacement of labour as in the coal industry, but not to the same extent. The problem of transference to other industries did not arise acutely,

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owing to the rapidity with which the main part of the reorganisation was carried out, and to the astonishing expansion of demand for steel and steel goods during 1926 and 1927. In the coal industry a permanent, or at least a long-continued, contraction of production had to be provided for. The chief task of the Steel Trust and the other large undertakings outside the Trust was to overcome the difficulties of a temporary crisis of low production in relation to potential capacity, and consequent high costs. With the lowering of costs trade was stimulated. The export sales were increased by reducing prices to the level of the Belgian and French competitors who had the advantages of exchange and of very cheap labour. In Germany itself there was much criticism on the ground that internal prices were so much in excess of export prices, but this was met with the contention that the gain of the export trade by cutting prices made it possible to keep the works employed at full capacity, and that otherwise the home prices would have been still higher owing to the heavier production costs.

The rapid growth in the production of iron and steel is shown in the following table :

	<i>Iron</i> <i>tons</i>	<i>Steel</i> <i>tons</i>
1924	7,800,000	9,800,000
1925	10,100,000	12,100,000
1926	9,600,000	12,300,000
1927	13,100,000	16,300,000

In 1927, therefore, the 1913 output of pig-iron in the present German territory was exceeded by

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2,000,000 tons, and the production of steel by 4,000,000. The production of steel was less than 3,000,000 tons below the 1913 total for the whole of Germany and Luxemburg in 1913, when the output in the Saar was 2,000,000 tons, in Alsace-Lorraine and Luxemburg over three and a half millions, and in what is now Polish Upper Silesia about one million. Recovery on this scale can only be regarded as astonishing, when the position of the industry in 1927 is compared with the critical conditions four years earlier. It cannot be doubted that the rationalisation process inside the industry, as well as the increasing demand for steel goods created by the reorganisation of the other staple industries, contributed substantially to this recovery by its beneficial effect on costs.

The independent firms and the Trust shared in the improving trade, and, therefore, the published results of the working of the Trust may be taken as typical. Towards the end of 1927 there were persistent rumours in Germany that the financial position of the Trust was unsatisfactory. In order to counteract the effect of these rumours on the stock market an official advance report was issued. In this it was declared explicitly that, as the rationalisation plans projected at the time of the formation of the Trust had been progressively carried out, the anticipated saving in overhead costs in relation to output had been realised, but this achievement had been counterbalanced by heavier taxation and higher wages, in addition to the low export prices.

A "satisfactory gross profit" for the first full year's working was foreshadowed, and it was stated that, with the steady increase in output both of pig-iron and raw steel, the number of workers and officials employed in

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the whole of the works had advanced by just over 13,000 during the year to a total of 198,000.

This reference to the number of workers was illuminating. The precise number of men dismissed during the first stages of rationalisation is not known, but at the beginning of 1926 the number of officials and workers employed by the Trust was 173,400. During the next two years the number grew steadily. Thus more workers came to be employed than the total of the separate concerns before the fusion took place, but it is to be noted that, while the output increased by about one third during these two years, the increase in the number of workers was only one seventh.

This is explained by the fact that the average daily output of each worker increased substantially owing to the concentration of production in the most modern works, and the time saved by continuous production in the specialised mills.

Here again precise figures for the whole period are not available, but, according to an unofficial statement during the first year or so of the rationalisation period, the average daily output of steel per worker increased by 36 per cent.

When the first full year's balance sheet of the Trust was published four months after the preliminary report just referred to, it was described in the leading trade journal of the Ruhr as a "pleasant surprise." It covered the twelve months ending September 30th, 1927, and revealed a gross surplus of £14,000,000. Many people in Great Britain believe that German industry carries a relatively light burden of taxation and contributions for social services. The complaints on this score, however, are as general and sustained in Germany as in Great

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Britain, and the amounts paid by the Trust were £3,000,000 for taxes and £2,500,000 for social services. Loan interest took £1,500,000, no less than £4,250,000 was added to the depreciation fund, and there was a small carry-over after providing £2,600,000 for the payment of a dividend of 6 per cent. The rapid recovery indicated by these figures from the conditions of financial stringency and loss of 1924-5 needs no emphasis.

Generally speaking, wages did not rise in the iron and steel industry to quite the same extent as in the coal-mines, but there was a substantial improvement between 1924 and 1927, even before the full benefits of the rationalisation were realised. The employers contended, indeed, that the increases were in advance of the actual economies achieved, and certain increases in price were defended on the ground that the combined effect of higher wages and heavy tax and social service payments left them with no alternative.

The minimum pay for skilled men in the Ruhr industry was 7½d. an hour in 1924, and by the early part of 1927 it had risen to about 10d. Actual earnings were higher than the basic rates, and piece workers received on the average about 30 per cent. above the hourly rates. These figures are given simply to show the rate of increase during the three years, and not as an indication of the earnings of the iron and steel workers, who, as in Great Britain, are divided into various categories with a fairly wide range of income—as between labourers and furnace charge hands, for instance. It may be said broadly, of course, that earnings are lower in the German industry than in the British, and, in particular, that the wages of the men in responsible positions—such

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as furnace charge men and the leaders of the rolling-mill teams—are much nearer to the average rates than in the British works.

There was also a steady improvement in hours, as well as in wages, as the reconstruction proceeded. The eight-hour day was reintroduced for coke oven and blast furnace workers early in 1925, but at this time the average for the other workers ranged from 54 to 60 per week. In the working up section of the industry the normal time was 56 hours a week.

Taking all the workers, the percentage employed for not more than 48 hours a week was 25.4 in 1924. This had risen to 35.5 in April 1927, and to 45.9 by the end of 1927. The percentage working more than 54 hours was 21 in 1924 and only 9.5 at the end of 1927.

In the latter part of 1927 the Minister of Labour issued a decree to restore the eight-hour day throughout the iron and steel industry as from the beginning of 1928. This evoked a threat from the employers to close down the works entirely, and, after negotiations and a reference of the issue to an arbitration court, an award was made binding by the Minister. According to this award the three-shift system was restored in the Thomas furnaces at the beginning of the year. A postponement was allowed in the case of the other types of furnace, and it was left open to the employers to ask for a re-examination of the circumstances if they desired a further postponement.

The Steel Trust has maintained reserve about the actual achievements of the technical reconstruction in reducing costs. It has been stated, however, that one important result of the concentration of production in the most modern and efficient furnaces, combined with

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an extension of the "continuous process" method of carrying through the operations from blast furnace to rolling-mill without allowing the metal to cool, and also with the highest development of furnace gas utilisation, is a saving of fifteen hundredweights of fuel per ton of steel produced. At the August-Thyssen works, now producing 2,200,000 tons of steel a year, no coal is used except in the coke ovens. The whole steelworks are operated by blast furnace and coke oven gas and by gas-generated electricity. Only thirty men are employed on blast furnaces, yielding 900 tons of iron daily, and the coke consumption per ton of iron produced is below one ton.

Reference has been made already to the rationalisation of the Krupp works. This process continued throughout 1927, and the programme, particularly in connection with the construction of new blast furnaces and associated works near the Rhine, was extended throughout 1928. The results as shown by the 1927 accounts were remarkable. At a critical period of the rationalisation process, when 20,000 of the firm's workers were unemployed, an unsuccessful attempt was made to obtain a subvention from the Government in the form of a loan at little or no interest. After this failure the firm secured a loan of £3,000,000 in the spring of 1927. Of this, £750,000 was allocated for expenditure on re-equipment, and a bank debt of £150,000 and an American loan of £1,500,000 were liquidated.

During the year coal production at the Krupp mines increased by 10 per cent. over 1926, and the output of coke was 22 per cent. higher. The production of raw steel rose from 1,400,000 tons in 1926, when the British

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coal stoppage created favourable conditions, to 1,800,000 tons, constituting a record in the history of the works. The output of stainless and other special steels also rose substantially, and, in this field particularly, the firm redoubled its research and manufacturing efforts to establish its supremacy.

After allowing £450,000 for reconstruction, there was a gross profit on the year of £2,450,000, not far below the record profit of the later war years. From this was written off £475,000 for depreciation ; taxes and contributions to social services amounted to £1,300,000 ; and there was a net profit of £650,000.

The number of workers continued to increase during the year. At the climax of rationalisation the total number employed by the firm at all their works fell to 46,000. By the end of 1927 it had risen to 86,000, this being more than at any time except during the war.

Little, if any, less favourable was the experience of the Kloeckner concern, another of the independent companies with important colliery interests. From the difficulties of 1924-5 this undertaking emerged to the dividend paying stage in 1926, when 5 per cent. was paid. This was increased to 7 per cent. for the year ending June 1927. In accordance with the conservative financial policy generally adopted at this period by the principal companies in the staple industries, a very large proportion of the revenue was set aside for progressive technical reorganisation. The programme included new central coke ovens, nitrogen works, cement works, and the continued modernisation of rolling-mills.

The increase in production during the year covered

by the accounts was accelerated in the later months of 1927, and by autumn the output had risen to 115 per cent. of the quota allocated by the Ingot Steel Association. At this time the total sale of goods produced by the firm was 37 per cent. above the amount for the corresponding period of 1926. At the annual meeting of the company Peter Kloeckner, the head of the concern, stated that the orders in hand would keep the works fully employed for several months in 1928, on the basis of 80 per cent. of the output for the inland trade and 20 per cent. for export.

Like all the other industrialists he complained bitterly of the burden of taxes and social services, and stated that the combined contribution of his company amounted to £750,000 for the year on a total share capital of £4,500,000. The heaviness of the burden was not disputed by the workers' leaders, but, in view of the generally favourable results of the year's working, caustic criticism was evoked by Mr. Kloeckner's suggestion at this meeting that German industry would not continue to be able to bear the burden, to meet the reparations payments, and to face the British price-cutting in the export coal market, unless the German miners would agree to work the same hours underground as the British—an extension of half an hour per shift.

Having regard to the similarity of the results of all the important steel concerns, a long report on the general situation issued by the Board of the Steel Trust just before the annual meeting in the spring of 1928, may be accepted as a representative survey of the industry, and an authoritative expression of the employers' point of view on rationalisation and the

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issues raised by the experience of the operation of the process.

The opinion was emphatically expressed that the advantages of the increased production and savings had been largely counterbalanced by the sharp competition in the export market and the increased burden of taxes and social service contributions.

In the first stage of rationalisation, it was stated, the following works had been closed or partially closed : shafts at thirteen mines ; one coking plant ; five briquette works ; old blast furnaces at ten works ; rolling-mills at eight or nine works ; old steel furnaces and foundries ; and many miscellaneous works. Simultaneously, with increasing demand for steel, and the availability of considerable financial resources, the remaining works had been technically improved and extended. The replanning of the works as a whole had been substantially completed.

To some extent, this work had been retarded by growing costs, especially the higher wages and reduction in working time, together with the increase in the burden of taxes and social services.

The following figures, showing the cost per ton, were given in support of this statement :

	1913-4		1926-7	
	Coal	Raw Steel	Coal	Raw Steel
	s. d.	s. d.	s. d.	s. d.
Social Service				
Contributions	6	1 5	1 4	2 11
Taxes	3	1 2	10	5 8
Total	9	2 7	2 2	8 7

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It was argued from this that further attempts to drive up wages would result in a shrinking of the export trade, and an increase in inland prices. A "speedy return from these impossible ways" was held to be requisite for further progress.

No suggestion was made, however, that the projected rationalisation measures would be held up, and the vigorous manner in which this work had been pushed forward during the year was emphasised. Attention had been concentrated specially on the mechanical re-equipment and improvement. The opinion was expressed that the general position, and particularly the state of the export prices, called for an acceleration of the rationalisation programme, which had been planned for five years. During the year, about £5,000,000 had been provided for this work, of which £2,000,000 was for the collieries and coking plants. The remainder was being applied to the reconstruction of the iron and steel works, the connecting railways, new harbour works, and the extension of the gas and electricity works.

Three new central coking plants had been constructed, and work had begun on new batteries of ovens at six other mines, with a total capacity of 3,500,000 tons of coke a year. A grandiose reconstruction scheme was in progress at the August-Thyssen works at Hamborn, where it was hoped to put into commission by September 1928 a new blast furnace of 1,200 tons daily capacity and new steel furnaces, which would give this group of works—holding a predominantly important position for the export trade—a total productive capacity of 2,500,000 tons of raw steel per year. At the Ruhrort-Meiderich works, also

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favourably situated for export, a notable advance in furnace practice was marked by the erection of a 200 tons Martin furnace and new converters. The other works in progress included new furnaces of 150 and 200 tons capacity and an extension of the tube works at Bochum ; a new furnace and a new rolling-mill at Dortmund ; and the extension of the Düsseldorf tube works.

Despite a remarkable advance in labour-saving devices and machinery, the number of workers had steadily risen. The increase in earnings was indicated by the fact that, while the number of workers had gone up by 16 per cent. since the formation of the Trust, the monthly wages account had increased, in the two years, by 44 per cent. The expenditure on "legal" social service insurances amounted to £2,430,000 for the year—this being an increase of 10 per cent. over 1925-6—and the "voluntary" social contributions, including the special pension scheme for the miners, to £261,000. The taxes and share of the Dawes scheme payments amounted to just over three million pounds, and the combined cost of all these services was equal to 14 per cent. on the share capital.

In view of this burden great importance was naturally attached to the development of the sale of coke oven gas through the Coal Utilisation Company, in which the Steel Trust held 21 per cent. of the share capital. It was hoped that shortly an agreement would be concluded with this body for the sale of 35,000,000,000 cubic feet of gas annually. Favourable results were expected from this development, from the operation of the new coking plants, and from new methods of using gas in the works complex of the Trust.

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The report stated that the low export prices of steel and of coal had seriously affected the financial position of the Trust during 1926-7. Taking into account both direct export sales and inland sales of steel under the bounty system for working up for export, the average price received had been only from 10 to 15 per cent. above the 1913 level, while wages had almost doubled, and the tax payments and contributions for social services had more than trebled.

At the annual meeting of the Trust, Dr. Voegler's comments on the situation were in a mingled vein of anxiety and confidence. He contended that the profit was not high enough and that the provision for depreciation was not adequate. The cost of reconstruction with foreign money was only a little less than the saving achieved, but as the burdens grew they must continue with the task or go out of production.

He noted as a favourable circumstance the tendency of the world price of steel to rise, so that the margin between inland and export prices was growing smaller. The production for the first quarter of 1928 had been maintained at the good level of 1927, and if this position continued the future could be regarded with quiet confidence, if it were not for the disturbance of progress caused by the new wages and hours movement. He expressed the view that it would be better for the industrial and economical position of the country if more people were employed at less, but sufficient, wages—a comment which evoked criticism from the trade union leaders, who were urging more strongly than ever that Germany should adopt the American high-wage policy.

Dr. Voegler mentioned a significant instance of the

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co-operative relations between the Steel Trust and Krupps, as expressed by an exchange of works and quotas, to facilitate the concentration plans of both concerns.

At the end of March the Board of the Trust reported that the output of coal, coke, and steel was slightly higher than in the corresponding quarter of 1927, with a small reduction in the number of workers and officials, that the revenue from the export trade had increased, and that six of the new coking plants were in operation.

CHAPTER V

THE CHEMICAL TRUST

The production of chemicals is the one British industry in which a rationalisation movement comparable to that in Germany has been initiated. The enterprise of the combine known as Imperial Chemical Industries Limited is dealt with in the later chapter on the industrial situation in Great Britain in relation to rationalisation.

The fusion of the four companies which formed this British combine followed broadly the lines of the trustification of the German industry, with the difference that these companies had not been so closely associated before the amalgamation as the German concerns, which, in 1916, developed from a cartel into the somewhat closer form of association known as an *Interessengemeinschaft*. From this stage of "community of interests" a complete fusion in a trust form of organisation was evolved in 1925, the new body taking the name of "I.G. Farbenindustrie A.G." The British combine does not yet include important firms engaged mainly in the manufacture of fine chemicals and medicinal drugs, but in Germany the great Bayer concern, famous throughout the world for its pharmaceutical products and for its pioneer

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research work in this field, took a leading part in the formation of the Trust.

In this industry, therefore, we have an example, not only of rationalisation devised and carried out by a single combine, which for all practical purposes may be regarded as covering the whole industry, but of trustification conceived and carried through for the specific purpose of rationalisation. The firms which remain outside the Trust cannot be compared with Krupps and the other independent iron and steel concerns, or the separate coal companies. As an example of rationalisation the German chemical industry may be regarded as having been fused into one unit of control over the whole field of the most varied and intricate scientific and technical processes in the world.

The driving force of the rationalisation movement was derived not so much from financial difficulties as from the need to adapt the industry to new conditions and to direct the main productive activities into new channels. The unprecedented financial strength of the constituent concerns before the war—built up on a virtual monopoly in the manufacture of dyestuffs and special pharmaceutical products—was increased during the war, and even in the difficult inflation period substantial dividends were paid.

The trade position had radically changed, however. Under the stress of war conditions the manufacture of dyes had been developed in Great Britain, America, and France. The post-war production of dyes in Germany was little more than half that of 1913, and although an improvement was confidently expected there was no illusion about the possibility of recovering

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the old dominance. It was decided that contraction of this section of the industry and rapid expansion in the new field of synthetic products, opened out by the war-time development of the Haber-Bosch process of manufacturing nitrogen, were necessary. The object of rationalisation, therefore, was not merely to regulate production within a limited range and to reduce costs simultaneously, but to consolidate the whole industry on a basis of new and interwoven processes capable of expansion in an ever-widening circle.

The form of organisation known as the *Interessengemeinschaft*, from which the Trust developed, may be described as a federation in which a joint committee of the affiliated concerns directs the general policy, fixes production and prices, and organises sales, while permitting to the separate firms autonomy in the organisation of their works and research departments. To this extent, much progress had been made in the direction of "rational" administration of the industry.

For the far-reaching technical rationalisation, which was deemed to be necessary to re-establish the industry in a thoroughly sound position, an extension of central control, both of policy and management, was clearly needed. Only this way could overlapping and duplication of effort be eliminated.

The principal concerns in the *Interessengemeinschaft* formed in 1916 were the Bayer Company, with its extensive works at Leverkusen, near Cologne; the Badische Anilin and Soda Fabrik, with its chief centre at Ludwigshafen; Meister Lucius and Bruning, at Höchst, known later as the Höchste Farbwerke; Cassella & Company, of Frankfort; the Berlin Anilin

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Company; and the Griesheim Electron Company, at Frankfurt.

These firms, and others which were taken in subsequently were engaged mainly in the production of dyestuffs, synthetic nitrogen and fertilisers, pharmaceutical goods, fine chemicals, acids, films, oils, and aluminium and other metal alloys. The initial capital of the Trust was £32,000,000. The separate companies became, in effect, financial holding bodies, as in the case of the Steel Trust, which, indeed, followed broadly the administrative policy adopted by the Chemical Trust.

This was described at the time as "regionally decentralised centralisation." From the boards of directors of the constituent companies a central council of administration was formed, and this body was responsible for the supreme direction of the affairs of the Trust. Herr Bosch, the famous chemist who had risen to be the head of the Badische concern, became president of the Trust, and Herr Duisberg, the head of the Bayer Company, was appointed chairman of the administrative council.

To avoid the danger of the evolution of a close bureaucracy the works were grouped into four territorial units, for purposes of management and detailed administration—the Upper, Central, and Lower Rhine, and Central Germany. The three Rhineland zones contained principally the old-established works. In the Central German area, in the region around Halle, were situated the new works, based on the exploitation of extensive deposits of cheap lignite, or "brown coal," which were speedily to be developed into a vast complex of undertakings for the manufacture of the new synthetic products.

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One characteristic common to the chemical industry everywhere is the veil of secrecy drawn over the details of the business. This is traditional, and springs from the nature of the enterprise. Every effort is naturally made to keep secret information relating to research work, new discoveries, and the degree of success attained in the commercial operation of new processes. This habit has become engrained, and influences the whole policy of those responsible for the undertakings. Hence, there is less known about the rationalisation measures taken by the Chemical Trust, and the results achieved, than in the case of the other industries we have examined. The detailed accounts of rationalisation policy given by the Steel Trust, for instance, offer a sharp contrast to the reticence of the directors of the Chemical Trust, and this conspicuous secrecy has evoked complaint and criticism from the shareholders and those who are inclined to see a public danger in the formation of powerful industrial combines.

It is known that, so far as concentration of production is concerned, the methods were similar to those adopted in the other industries. In the dyestuffs section, for instance, the over-productive capacity was rectified by closing down obsolescent works and plant, cutting out overlapping units, and re-equipping the works maintained in production, with the object of reducing labour and other costs on the basis of full-time working.

In the competitive period the production of numerous shades of colour closely resembling each other had been carried out at great cost of duplicated research and manufacture. Redundancies of this kind were drastically eliminated. The centralised control of research made it possible to direct it to specific ends without

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waste of effort. In the production sphere each factory was assigned specialised tasks. Uninterrupted output of particular goods with the attainment of the lowest possible overhead charges in relation to production was the principal aim. The provision of reserve plant and stocks to meet the fluctuations of demand could now be kept to a minimum.

In the other older branches of the industry similar economies were achieved by the contraction and adaptation of the productive processes where it was necessary. The sales organisations were centralised and simplified, with the object of limiting the price margin between producer and buyer to the narrowest dimension. Finance was simplified. All superfluous balances formerly necessary under the separate ownership of the works were eliminated. The power to raise loans on the best obtainable terms was greatly increased, and altogether substantial economies were gained in this sphere, as well as on the production and research sides.

All this reorganisation was important, but it was on the pioneer work in the field of synthetic manufacture that the energies of the administration of the Trust were mainly concentrated. Here was a sphere of unlimited opportunity, opening out vast possibilities of enterprise and expansion. In it the principles of rationalisation, so far as they related to central control of production to regulate it to market demands, to mechanical efficiency and labour saving, and to simplified marketing, were applied with amazing energy. The process was directed, in fact, to the building up of a new section of the industry, and to the creation of markets for an increasing output of a new range of products.

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To attempt to describe the new enterprises in detail would lead us into intricate technicalities beyond the purpose of this book. It will suffice to indicate generally their nature and scope.

The starting-point was the exploitation of the synthetic nitrogen process discovered by Haber, the famous German chemist, and modified for commercial operation by Bosch. This process was developed as rapidly as possible during the war by the Badische Company, as the main source of the supply of explosives. After the war the Leuna works which had been constructed near Merseburg, in the Central German brown coal region, where electricity could be produced very cheaply, were steadily expanded for the production of sulphate of ammonia and other fertilisers. Prices were lowered, farmers were stimulated, by propaganda to use the synthetic products in ever-increasing quantities, and sales mounted rapidly. Large profits were made, and from these were built up reserves which made it possible in the next few years, not only to extend the works to meet the rising demand, but to embark on new and very costly research enterprises.

These were mainly concerned with the production of oil from coal and lignite. The Badische Company had acquired the German rights in a process discovered by Dr. Bergius for the production of oil by applying hydrogen at high pressure to coal, by which means a very large proportion of the coal was transformed into oil, without any residue of solid fuel, as in the case of low temperature carbonisation.

After the formation of the Trust it was decided to test out this process on a commercial scale. The Badische research workers had produced modifications

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of the process to adapt it specially for the treatment of lignite, and the first factory was therefore erected as part of the Leuna group. Here there was unlimited cheap electrical power derived from the rationalised brown coal-mines. With mechanisation and the development of automatic machinery carried to such a stage that hand labour was almost eliminated, from the mine to the furnace, this fuel could be delivered into the furnaces of the power station and into the oil extraction factory at a cost equivalent to 7s. per ton for ordinary coal.

The production of hydrogen on a vast scale served both enterprises, the manufacture of synthetic fertilisers and the treatment of the lignite for oil extraction. But this was only the beginning of the intricate inter-relation of processes, which the Trust now proceeded to develop, and which was made possible by the accumulation of huge financial resources and a centralised direction of specialised effort. Intense research was carried on with the object of discovering commercial methods of utilising by-products of the established processes as the raw materials for more varied combinations or new manufactures. Other forms of nitrogen fertilisers, particularly in combination with a by-product carbonate of lime, were evolved, and the production of complete fertilisers extended the use of phosphatic substances produced by the industry, and paved the way for closer association with the potash concerns.

Meantime, the research workers had been working out new methods of producing synthetic alcohols and motor spirit, and before the end of 1927 these developments, in conjunction with the successful working of

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the oil extraction plant, led to an arrangement with powerful oil distribution interests, and enabled the Trust administration to announce that a very large quantity of motor spirit would be placed on the market during 1928. The rapid extension of the oil extraction works to an annual output capacity of 700,000 tons of oil by 1930 or 1931 was predicted.

The Trust also acquired important interests in the artificial silk industry by financial association with the Bemberg Company and the Glanzstoff concern, with which Courtaulds are closely connected. All these developments have been governed by the principles of rationalisation—control of production in relation to demand, the elimination of price-cutting competition, the central organisation and simplification of marketing and distribution, the prevention of waste in transport, and the reduction of costs by the fullest possible utilisation of labour-saving machinery.

Owing to the fact that, side by side with the contraction of the older sections of the industry to bring their production in relation to a restricted market, the development of the newer enterprises was proceeding at a rapid rate, the effect on the workers was not the same as in the coal and steel industries. In the aggregate there was no initial displacement, but a transference of the principal centres of employment and a steady increase in the total number of people employed. During 1927 the increase amounted to 20,000, bringing the number of the Trust's employees and officials to 110,000.

Having regard to the desperate economic situation of German industry generally through the inflation period and up to 1926, the financial position of the

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Chemical Trust at the end of 1927 can be truly described as an astonishing tribute to the energy, skill, pertinacity, and imaginative planning with which the industry had been piloted through its difficulties.

In September 1926 the capital was raised to £55,000,000, a large part of the new capital being used for the construction of the costly new works at Merseburg, and at the beginning of 1928 an issue of £12,000,000 of bonds was sanctioned for still further developments in this region. Very large profits were made from 1925 onwards, but the traditional conservative policy of limiting the distribution to shareholders was maintained. For the year 1926-7 a 10 per cent. dividend was paid out of a net profit of £3,500,000 and out of the gross profit no less a sum than £3,750,000 was allocated to depreciation. At a meeting early in 1928, called to consider the bond issue, a reticent but highly optimistic reference was made to the general position of the Trust, and a dividend of 12 per cent. for 1927-8 was foreshadowed. This was confirmed shortly afterwards by the issue of a report, which, despite its reserve, indicated remarkable expansion and prosperity.

The net profit was over £5,000,000, an increase of £1,500,000 during the year, and the total value of the works was shown as £2,000,000 higher than in 1926. The turnover increased by about one-fifth. Reticence was still maintained about the productive capacity of the new oil extraction works, but it was announced that the output was steadily increasing, and that the oil was sold without difficulty.

The ever-growing importance of research was indicated by the fact that, out of the total staff of

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110,000, the number of chemists, engineers, and administrative workers was over 23,000. In these early months of 1928 there was immense activity at the Leuna works. Nearly thirty thousand men were employed on normal productive work, and many thousands were engaged in the construction of new buildings, plant, and connecting railways.

A broad picture of the general effect on the whole industry of the combination of interests, and of the subsequent rationalisation, is presented by the export of chemicals. From 1925 onwards the recovery from the early post-war depression was rapid, and by 1927 Germany had regained its supremacy as a seller of chemical products in the markets of the world, with the exception of heavy alkalis, in which section the British industry continues to hold an unchallenged position.

The export of dyestuffs increased from 27,000 tons in 1926 to 34,000 in 1927, but the measure of contraction in this branch of the industry is indicated by a comparison with 1913, when 82,000 tons was exported. Taking the whole of the German chemical products, however, the value of the new enterprises and the growing sale of synthetic nitrogen products is seen in the rise of the total export from £54,000,000 in 1926 to £65,000,000 in 1927—this being 50 per cent. more than the chemical exports from the United States and double the British export value.

In the important potash section of the German chemical industry the conditions in 1924 impelled the producing firms to adopt drastic rationalisation measures. The post-inflation difficulties caused by lack of liquid capital were increased by low demand and a

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large surplus productive capacity. Regulation on a uniform plan throughout the industry was not possible at this stage, owing to rivalries between the producing groups and various financial manoeuvres to obtain control. The Wintershall concern, which controlled not far short of half the production, took the lead in closing down the less remunerative shafts and works, and their example was soon followed by the other groups.

By the middle of 1925 only 60 shafts out of over 200 were in operation, and the number of workers had fallen from over 50,000 in 1923 to about 30,000. From this time onwards the modernisation of the plant and the development of new by-product works proceeded apace. Foreign loans were obtained for this purpose. By 1926, when a profit-making position was regained, it was considered that over a hundred of the closed shafts would remain permanently out of production, and about 30 were kept as a productive reserve, to be operated or closed according to the state of the market.

A quota system of regulating output was restored, and by interlocking of shareholding the control of production came finally to be vested in two groups. The development of the manufacture of complete fertilisers at the Leuna works of the Chemical Trust brought this body into closer relations with the potash producers, and opened the way to a still greater consolidation of interests in the future. In this industry the number of workers employed appears likely to be permanently reduced, owing to the extent to which the mechanisation has affected manual labour. By 1927 the total staff had been reduced to about twenty thousand.

CHAPTER VI

GENERAL INDUSTRY AND POWER

Although it is in the "basic" industries that technical rationalisation has been undertaken in its most drastic and complete form in Germany, the principles have been applied in varying degrees in the other industries. All were seriously affected by the same causes. Everywhere there was the same urgent need to regulate a surplus productive apparatus, to reduce the ratio of overhead and labour costs to output, and to prevent the loss which was an inevitable result of competitive price-cutting in these circumstances. The extent to which the rationalisation process could be applied differed widely, and each industry had to adapt it to its own needs and conditions. Naturally, mistakes were made, but on the whole the results were as notable in their degree as in the larger industries where the process was carried through in more spectacular fashion.

From the time of the stabilisation of the currency to 1925, the older branches of the textile industry—wool, cotton, and linen—were deeply involved in troubles arising from lack of trade and the financial position. Bankruptcies were numerous, and forced sales of stock helped to break down the cartel price-fixing organisations. The position, indeed, was comparable with that

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in Lancashire in 1927, when the efforts of the Yarn Association to regulate output and impose a minimum price standard failed because of the fierce competition for a restricted amount of business.

In Germany the situation was not quite so desperate as in Lancashire, owing to the fact that the textile industries depended less on export, but, until the general revival of purchasing power in the home market was brought about by the progress of the rationalised heavy industries, there was much unemployment, and wages were very low in the textile centres.

Meanwhile, rationalisation measures were adopted in the textile industry, and important amalgamations were promoted to facilitate the process. Production was concentrated in the most suitable mills, and these were re-equipped and re-organised on a labour-saving basis to give an ordered flow of the material as it passed from stage to stage of manufacture and finishing. The economies resulting from this reorganisation, and from the introduction of new machinery, were all the greater because of the "vertical" construction of the industry, that is, the association in one concern of spinning, weaving, dyeing, printing, and other works, in contrast to the "horizontal" alignment of the British industry, in which, for the most part, the various processes are carried out in separate and self-contained works.

As rationalisation proceeded prosperity was gradually restored. The producing firms, with simplified sales organisations and substantially lower costs, were in a position to reap the greatest advantages from the rapid increase of trade during the latter part of 1926 and throughout 1927, when higher wages and salaries gave

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greater purchasing power to the working and middle classes throughout the country. Wages rose in the industry, and the number of workers increased.

To take the experience of one of the Augsburg woollen concerns as a typical example of the rapid change in conditions, the report of the firm for 1927 stated that production throughout the works had increased by 20 per cent. over 1926, and that the output of the weaving department had doubled. The total turnover was 169 per cent. over the pre-war record year, 1913. The dividend was increased from 12 to 14 per cent., and the amount allocated to depreciation, and the completion of re-equipment was almost as much as the net profit.

A woollen concern with £2,500,000 capital increased its depreciation from £104,000 to £215,000, and its net profit from £200,000 to £312,000, from which a 12 per cent. dividend was paid. Still another, with a capital of £500,000, reported a gross profit of £265,000, of which £50,000 was allocated to depreciation, £25,000 to a special reserve (bringing the total reserves to one third of the share capital), and £135,000 to net profit, from which a dividend of 12 per cent. was paid, against 8 per cent. in 1926. During the year, £37,000 had been spent out of current income in completing new buildings and machinery, but in spite of these improvements and extensions the works had been operated three shifts a day throughout the year to cope with the demand.

Comparable progress was recorded by cotton concerns, and the 1927 results were attributed as much to the savings in cost in the rationalised works, and to the restoration of full cartel control by co-operative action throughout the industry, as to the general

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revival of trade. The effect on employment of the enlargement of the mills and plant is indicated by the fact that, in the cotton branch alone, the number of workers rose by over 40,000 during 1926 and 1927. In the early part of 1928, however, there was a tendency for trade to slacken both in the wool and cotton sections of the industry.

The principles of rationalisation were applied in the rapid development of the artificial silk branch of the industry, which escaped the difficulties of the older sections. The consolidation of the mills under the control of one or two groups made it possible to plan the new buildings and equipment according to a clearly thought out programme, and the position of the firms was immensely strengthened by their international affiliations and the intimate association with the Chemical Trust.

For the most part, the German engineering industry was organised in big-scale units before the war, and the final result of the unstable "vertical" fusions in the early post-war years was to leave a still smaller number of controlling groups. In the electrical machinery manufacturing section, for instance, the General Electric Company (the A.E.G.) and the Siemens and Halske and Siemens-Schuckert concerns were dominant.

All these powerful concerns undertook a vigorous rationalisation programme, and they were specially favoured in the wealth of the harvest reaped from it by the enormous demand for machinery and other engineering products created by the technical

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reorganisation of the coal, iron and steel, chemical, textile, and other industries. The process was similar to that already described—concentrated and closely-regulated production, comprehensive modernisation of plant, mass production on specialised lines in particular works, the reduction in transport costs by every possible means, and the elimination of unnecessary intermediate agencies for the purchase of materials and the sale of products.

The sound financial position attained by the Krupps concern, already described in the chapter on iron and steel, was partly due to the reorganisation of the manufacturing departments of the firm, which cover a very large part of the field of general engineering. The progressive restoration of prosperity in other concerns is sufficiently indicated by the 1927 reports of the electrical combines. The A.E.G. increased its net profit by £80,000 to £617,000 and its dividend from 7 to 8 per cent. The net profit of Siemens and Halske rose from £310,000 in 1925 to £820,000 in 1927, and the dividend was increased from 10 per cent. in 1926 to 12 per cent. Siemens-Schuckert increased the net profit by £150,000 over 1926, and increased the dividend from 8½ to 9 per cent., despite an addition of £1,500,000 to the capital during the year.

The general engineering industry afforded an interesting example of combination to create conditions favourable for rationalisation. In the railway waggon-building section serious depression was experienced, owing to excessive competition, lack of trade, and high costs. At the end of 1926 an association of thirty of the principal firms concerned was formed at the instance of the State Railway Company, which guaranteed the

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associated concerns go per cent. of its orders on certain conditions. These included an undertaking from the firms that everything would be done to bring about rationalised production, and a stipulation that the price of the waggons would be virtually fixed by the Railway Company.

The Association purchases the materials required by the affiliated concerns through an arrangement with the Steel Trust and its selling organisation, and so ensures the maximum of economy in this department. The firms have reorganised their works on familiar lines, an enterprise which was not possible while competition and over-production created unstable conditions. The financial position has improved substantially, but it is suggested that the State Railway Company gets the main advantage through the lower prices of the waggons. In the long run, of course, the benefit should filter down to industry generally. It may also be noted incidentally that the gains in transport economy, already derived from the single ownership of waggons by the railway and the standardisation of types and parts, which had been easily attained under this common ownership, were substantially increased by the rationalisation of manufacture.

In the construction of motor vehicles of all kinds the German manufacturers remained far behind the British and American in the years immediately following the war. Apart from a few special lines developed by one or two concerns, there was little progress either in design or methods of manufacture until 1926, when the rationalisation habit spread to this branch of the

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engineering industry. Then there were fusions to facilitate modernisation of plant for mass production and the standardisation of types. This involved the dismissal of many workers at first, but re-absorption took place as the industry expanded, and from the economies and increasing revenue the workers received increases in wages amounting to about 15 per cent. during 1927.

The conditions in the German shipbuilding industry were not favourable for rationalisation. It is more difficult to close down a whole shipyard, or part of one, for the concentration of production than to scrap an old building and plant in a steelworks, and it is still more difficult to organise a specialised output in particular yards on standardised production lines. The more important concerns, such as Blohm and Voss and the Deutsche Werft, backed by powerful financial, iron and steel, and engineering interests, manifested no disposition to promote mergers to absorb the smaller yards.

These minor concerns remained depressed throughout 1926 and 1927 owing to the strong competition of the larger undertakings, and this circumstance induced Herr Schroeder, the Bremen banker, to extend his rationalisation finance operations by the promotion of a fusion of several small yards towards the end of 1927. His avowed purpose was to close down gradually the more costly works and to transfer the orders to one or two reorganised yards, with the double object of achieving substantial economies and limiting competition.

There were general discussions on the possibility of closer concentration involving the other concerns,

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and the advantages of centralised purchase of materials and simplified administration were stressed. Whether these discussions will lead to further combinations or to partial trustification in the near future it is impossible to say.

The cartel organisation of the linoleum trade, so far as price-fixing is concerned, has long been established, both nationally and internationally. In some countries this has not favoured the consumers, as the price-fixing has assumed the ring monopoly characteristic without any particular regard to the increase in efficiency of the manufacturing and distributive processes throughout the industry as a whole. In Germany rationalisation proceeded rapidly in this industry during 1926. A combine was formed to control at least 90 per cent. of the national output.

The works were modernised, and the outstanding feature of the rationalisation was the allocation of production at the various factories on a territorial basis, so that both home and export market could be supplied with the minimum transport costs. Prices of important products were reduced to stimulate demand and ensure full-time working of the factories, and substantial dividends were paid during 1926 and 1927 out of increased profits.

Through one of its associated concerns the combine is linked up indirectly with the Chemical Trust, and it is expected that, in future, the industry will derive great advantages from any of the Trust's research discoveries which may be applicable to the processes of linoleum manufacture.

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In the pottery trade also, concentration of interests and modernisation of factories and plant have been energetically fostered during the past three years. The installation of the latest automatic machinery has been stimulated by the intensive electrification of the country and the consequent availability of cheap power. Research organisations have been pooled, and notable results have been achieved, particularly in relation to firing methods and fuel saving. With this development of co-operative action the industry has made a recovery not less remarkable than the other results of rationalisation recorded in the foregoing pages.

The story of the development of the German national organisation for the generation of electricity since the war is one of a revolution in power production, carried through with astonishing energy and concentration of purpose in face of immense financial and industrial difficulties. It may be taken as the peak achievement of a nation faced with the alternatives of being permanently "down and out," or of rebuilding a shattered industrial and economic structure by a desperate and gigantic effort, in which many individual and sectional interests had to give place to national considerations.

We are concerned here, however, with this achievement only in so far as it offers an example of rationalisation of production. Germany is now covered by a network of high voltage overland transmission lines and secondary cables carrying the current from the transforming stations to the users. The organisation is on a zone basis, corresponding roughly, but

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not completely, to the territories of the federated States.

Stage by stage the control and administration, so far as the generation of current is concerned, have become vested in a single authority in each zone, while the distribution is left to municipalities and other local bodies. The executive authority is usually in the form of a limited liability company acting for the owners, whether it be the State or an association of interests. For instance, the Central German stations belong to the Reich ; the Prussian, Saxon, and Bavarian States have a controlling financial interest in their own territorial spheres ; while the great Rhenish-Westphalian undertaking, known as the R.W.E., is jointly owned by the municipalities, the Prussian State, and "big business." By this limited liability company method the danger of rigid bureaucratic administration, or of political influence on policy, is avoided. The undertaking is run on ordinary commercial lines, with the important proviso that interest on capital is limited and the ideal of public service is predominant in policy decisions. The directors, all experts in their particular sphere, are chosen by "general assemblies" appointed by the owning bodies to carry out the function of general supervision, and within defined but wide limits the directors are invested with executive authority.

With the gradual evolution of this system rationalisation was facilitated. The three capital stations of the Reich system have a total capacity of 700,000 kilowatts. The Zschornowitz station in this group, with 430,000 kilowatt capacity, is the largest in Europe, and the latest special station, at Rummelsburg, belonging to the Berlin municipal supply and linked

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up with the Central German system, derives its main power from three sets each of the enormous capacity of 80,000 kilowatts.

These great stations can, of course, be run economically only on a very high average load factor. The operation of the three Reich stations of the Central German system may be taken as an example of the method. The distributing authorities in Berlin (100 miles distant), Dresden, Leipzig, Magdeburg, and the smaller towns and villages in the zone, contract for a fixed daily amount of current, so that the stations are run with the least possible variation. The fluctuating demand in the distributing areas is met from smaller stations. The main supplies, therefore, are obtained at a price which would be impossible under any other conditions.

For instance, current is delivered over 100 miles of overland cables, at 110,000 voltage to the Berlin transforming station at less than the cost of generation in the older stations in the city. In this way, the average cost of current to the distributing bodies, allowing for the higher charge for the current generated at the smaller local stations to meet the fluctuating demand at different parts of the day, has been reduced substantially. While small consumers must still pay the necessary heavier charges for distribution service, industrial users of large quantities of current derive material advantage from the rationalised system.

In the Rhenish-Westphalian zone, which extends from Osnabruck in the north to beyond Frankfort-on-Main in the south, with the overland cables in the southern section transmitting current at over 200,000 volts, the Goldenberg station, like those in Central

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Germany, uses brown coal as fuel. Linked up in this system are several capital stations run on ordinary coal belonging to the company, as well as the great majority of the stations belonging to the coal and iron companies.

During the hours of peak consumption at the stations belonging to the mines and works, current is taken from the overland lines, and during the slack periods the surplus current is put into the mains. Therefore, these stations also can be operated at a high point of efficiency, and another important advantage is that no stock of spare parts need be carried at the smaller stations. If a breakdown occurs the station is shut down while the repair work is done, and all the current required in the meantime is taken from the general system. The possibility of large aggregate savings opened out by this mutual adaptation to needs is self-evident.

In the areas where water power is available, mainly in the south, the load factor is equalised, and production costs are reduced by operating the steam stations at high average load and meeting the fluctuating demand from certain water power stations, where the output can be varied throughout the day, without any considerations of fuel cost, by shutting off or re-opening the water supply to particular turbines.

The economies, resulting from this system of control and regulation, by which the highest degree of efficiency can be obtained throughout the supply service, are increased by the newest methods of getting and distributing the fuel at the brown coal stations. Here one sees attained the utmost limit of mechanisation. In the main the lignite is mined from wide open quarries, and gigantic electrical scooping machines are used for

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removing the "overlay" of earth and for taking up the lignite, which resembles fairly dry peat in texture.

The waggons conveying the fuel from the quarry to the station are emptied automatically into enormous hoppers, from which it passes on conveying belts to the hoppers over the furnaces. One man, sitting at a switch-board and receiving communications from the powerhouse engineers indicating their steam requirements, controls the flow of the lignite into eighty furnaces. In the great boiler houses the personnel consists of a few mechanics. The ashes fall from the furnace bars into a funnel, where they are sprayed by water and drawn by compressed air suction through pipes back to the cleared spaces of the quarry. From start to finish no manual labour, in the ordinarily accepted sense of the term, is employed in the process of winning and consuming from ten to fifteen thousand tons of brown coal per day.

This explains the fact that the cost of the fuel, delivered into the furnaces, is only 2s. per ton, which is equal to about 7s. for ordinary coal, on the usual reckoning that three and a half tons of lignite equal one ton of coal in fuel value. In conjunction with the vast scale of production—the output of the three Central German stations being about 1,750,000,000 kilowatt hours per year—it also explains the low price at which the current can be supplied in bulk.

In this organisation for the large-scale, concentrated generation of electricity, therefore, we see the application of the chief principles of rationalisation—central control of production, the most complete mechanisation attainable to eliminate the heaviest and lowest-paid

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forms of labour, and the avoidance of waste both of human effort and material resources—under a system of socialised ownership, combined with a modified form of ordinary industrial and commercial administration.

CHAPTER VII

STANDARDISATION AND SIMPLIFICATION

The standardisation and simplification of products is a natural consequence of the wider and more fundamental measures adopted in the reorganisation of the heavy industries, and is therefore regarded in these industries as a matter of secondary importance. The method of reducing manufacturing and commercial costs, and of eliminating waste effort, implied by these terms is, however, one of the most important in the rationalisation of the smaller miscellaneous industries, which do not lend themselves to large-scale combination. Indeed, in America, where economic conditions and industrial problems differ so widely from those in Europe, there is a tendency to interpret rationalisation mainly in relation to simplified production and scientific management, without reference to planned control of output throughout an industry and the other drastic changes to which this control has led in Germany.

This is attributable to the predominant place given to simplified practice in industrial discussions during the past four years under the dynamic influence of Mr. Hoover's advocacy, which gathered an immense persuasive force from his office as Secretary of the United States Department of Commerce.

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His educative propaganda campaign, initiated in 1921, brought a remarkable harvest of results. He argued that incalculable waste resulted from the manufacture of a large number of unnecessary varieties of almost every article in common use. Constant changes of machinery to produce relatively small quantities of each variety, the constant expense of producing different designs, and the necessity for carrying multifarious stocks, both in the factories, the warehouses of merchants, and the retail stores, not only increased the cost of manufacture, but made it more difficult to strike a balance between demand and production, thus adding to the factors which bring about booms and slumps.

Mr. Hoover also urged that more attention should be given to methods by which all-round efficiency might be attained, including :

The improvement of transport, and the reduction of loss by breakages and delay.

The elimination of unnecessary intermediary agents in distribution and sale.

The avoidance of merely wasteful and ignorant competition.

The improvement of statistical services, so that manufacturers might be better able to adjust output to the current state of the market.

While progress has been made in relation to all these matters the most spectacular results have been recorded

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in connection with "simplified practice," which Mr Hoover defined as follows :

"Simplified practice means the reduction of variety in sizes, dimensions, and immaterial difference in everyday commodities. Its purpose is to eliminate waste, decrease cost, and increase values in production, distribution, and consumption. It has nothing to do with style problems or matters of individual creation "

Under the stimulus of Mr. Hoover's propaganda, and on the initiative of the officials of his department, conferences of manufacturers, distributors, and consumers were convened in many industries. By the end of 1925 no fewer than nine hundred conferences had been held, and four hundred trade groups were engaged in working out schedules of simplified shapes and sizes. These schedules covered thousands of varieties of articles, and it is only possible here to indicate the extent of the movement and its results by noting one or two typical decisions.

Varieties of pocket-knives were reduced from 1,500 to 300 ; of hammers, hatchets, etc., from 2,752 to 761 ; of pipes and fittings from 17,000 to 610 ; of stoves and ranges from 2,982 to 364 ; of paving-bricks from 60 to 6 ; of spades and shovels from over 4,000 to less than 400 ; of blankets from 78 to 12.

The achievement has been described by Mr. Hoover as "one of the most astonishing transformations in economic history," brought about by co-operation between the Government Department of Commerce

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and industrial leaders. The effect of these agreements within each industry on manufacturing processes was notable. It became possible to simplify mechanical equipment and to adapt it for cheaper mass production on a scale not realisable without co-operation and regulation.

There are obvious limits to this form of industrial economy, and occasionally too little regard was paid to the danger of an appalling monotony, or to the need for meeting demand dictated by individual taste. But within these limits there is enormous scope for simplification in the varieties of purely utilitarian articles, and for this reason alone, the American example is being closely studied in other countries. It will unquestionably be widely followed.

Although there has been no movement in Great Britain comparable to the simplified practice achievement in the United States, it was in this country that pioneer work was started, as far back as the early nineties, with the object of promoting standardisation in engineering practice. A fine technical distinction is drawn between "standardisation" and "simplified practice." The first may be described as the process of devising standard specifications for all kinds of engineering products, with the object of combining the highest degree of quality and suitability for the purpose to be served. The second is concerned primarily with the wholesale elimination of unnecessary variations in every conceivable type of product without any particular regard for quality.

The standardisation work in Great Britain has been

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carried on mainly by a body known as the British Engineering Standards Association. It has received small grants from Government funds, but there has been no active co-operation of the kind instituted by Mr. Hoover, and the Association has had just cause to complain of lukewarm interest in the industry it serves. Under the circumstances it has a highly creditable record of work accomplished, and its influence has extended into the field of international standardisation.

The scope for extension of the work, and for the adoption of simplified practice measures throughout British industry, is almost unlimited. To take rail transport, as one of scores of examples that might be examined, it is obvious that very large savings could be achieved by the adoption of a standardisation and simplification policy by all the four groups. There are small variations in almost every class of equipment, in size and shape of the parts of signalling apparatus, of waggons, axles and springs, of engines, of warehouse equipment. There is neither a technical nor æsthetic reason why these differences should be perpetuated. No one who has watched the changing of rollers in a steel mill for the production of a few strips to make up a small order for waggon springs, of a design dictated by some personal idiosyncrasy, or who has examined the stocks of varied patterns, which have to be carried for this unnecessarily costly work, can doubt Mr. Hoover's assertion that the comprehensive simplification accomplished in the United States has saved millions in manufacturing costs.

The increasing interest aroused by the movement in America, and in a similar movement in Germany, has stirred the British Board of Trade to some sense of its

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responsibility and potentiality in this field of industrial reorganisation. In March 1928 a meeting was held, with the President of the Board of Trade in the chair, to consider, rather belatedly, how impetus might be given in this country to standardisation and simplification on the lines of the American and German movements, and the pioneer work of the British Engineering Standards Association. The need for a central organisation to direct the work was realised, and a committee was appointed to consider how this might best be evolved.

For fuller information on the American simplification and the British standardisation movements the reader may be referred to the report on *Factors in Industrial and Commercial Efficiency*, one of the publications of the Government Committee on Industry and Trade.

German industrialists who visited America after the war gave close attention to the programme of Mr. Hoover and to his methods of carrying it out. The result was that in 1925 the earlier industrial-economic organisation, which had been expanded into the Reichskuratorium für Wirtschaftlichkeit—which has been referred to in the introduction—was expressly charged by the Government with the duty of studying rationalisation in all its forms, including standardisation and simplification.

This body is composed of men representative of all branches of industry and commerce, technology and industrial science, and economic experts. In the three years it has been provided with funds from State sources to the extent of £200,000, and this independent

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financial position has enabled it to work without regard for any particular interests.

Its mission has been to propagate the ideas of rationalisation in every department of miscellaneous industry and trade. The staple industries, which had been able to work out their own rationalisation plans, did not need the help of the Reichskuratorium, so that it was left free to study particularly the methods by which the main principles of the process, carried out in the heavy industries could be adapted and applied to the different circumstances of the smaller concerns, which still operated more or less under competitive conditions.

It followed in these circumstances that, at the outset, attention was mainly directed to the organisation of a general campaign for the adoption, throughout miscellaneous industry and wholesale and retail trade, of the principles of standardisation and simplification. The point was emphasised, however, that mere copying of American methods should be avoided, and that the best forms of adaptation to German conditions should be studied.

This body has carried on its work with great energy during the three years. Subsidiary boards have been appointed to concentrate on particular aspects of the work, and to study the special problems of particular trades. These include standardisation, the use of waste products, management and administration, industrial psychology, vocational training of the young and the choice of work according to fitness, transport in relation to the distribution of goods, and the simplification of business forms and documents—with every aspect, in fact, of the question of saving labour effort,

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capital expenditure, and operating costs, and preventing waste of every kind.

One example will suffice to indicate the objects aimed at so far as commerce is concerned. A uniform method of book-keeping is suggested for a host of industries and trades which can adopt it without difficulty, so that simplification and mass production of the documents and books required may be promoted in the printing and stationery manufacturing trades. Educational work, for the benefit both of the general public and the manufacturers, has included the organisation of exhibitions to show the waste involved in the extraordinary number of unnecessary and useless variations in articles of common use which have come into existence under a system of entirely unregulated production.

Progress has not been so rapid or spectacular as in America, but the movement is steadily gaining ground. As will be shown later, the importance of this work can hardly be over-estimated when we consider it in relation to the problem of cheapening production throughout the whole field of industry, of increasing "real" wages by reducing prices, and of a rapid expansion of demand for all kinds of commodities, so that the labour displaced during rationalisation in the large industries may be re-absorbed with the least possible delay.

One of the most important recent extensions of work of the Reichskuratorium is the appointment of an expert board to study the application of the principles of rationalisation to agriculture. In no industry is there a greater scope for waste elimination by the increased use of machinery, electrical power, and scientific

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methods, and for improvements in the system of distribution and marketing.

Much work has, of course, been done in Great Britain during the past few years in connection with some of the matters just mentioned, particularly in relation to industrial psychology, vocational guidance, welfare work, and the prevention of accidents and industrial diseases which cause loss and inefficiency. The various bodies dealing with these matters are, however, acting more or less in isolation, and their work is often hampered by lack of funds. It is obvious that much more effective results might be obtained if all the activities were brought into association with a well-organised central directing body, which could co-ordinate the whole of the work and relate it to a comprehensive plan and policy for the achievement of the greatest possible efficiency and economy in every branch of manufacture and distribution.

CHAPTER VIII

OUT OF THE ABYSS

Any estimate of the general results of German rationalisation, or any attempt to measure how far it has contributed to the astonishing revival in all important industries during 1927, must be tentative. It cannot yet be suggested that the state of the country is normal. Having regard to the situation, not far removed from a condition of industrial collapse, in which the movement was inaugurated, to the pressure of circumstances which impelled the industrialists to a desperate speed in devising and carrying out the reorganisation programme, to the financial difficulties and growth of taxation, to the recent wage and price developments, and to the uncertainties in connection with the Dawes scheme for the payment of reparations, one may well believe that at least five years must elapse before anything in the nature of a definite judgment can be formed.

Nevertheless, it is worth while to attempt even a tentative survey. It is difficult enough in any event to avoid fallacious conclusions, but this certainly cannot be done unless one starts with a broad picture of the industrial, economic, and social conditions of 1923-4 clearly in mind. The wholesale impoverishment of the people—including the professional and commercial middle classes, and the industrial scientists, technicians, and

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officials—during the inflation period, was sharply accentuated throughout Westphalia by the French occupation. For nearly a year the coal, iron and steel, and associated industries in the Ruhr were almost at a standstill, and the most complicated system of transport in Europe was suspended. The people were just maintained at destitution level by the constantly accelerated output of the note printing presses. As the final abysmal fall in the currency was approached, the desperate state of the populace was reflected in sporadic riots. For a time the success of the widespread and energetic Communist efforts to exploit the sullen anger of the workers by directing it into revolutionary channels of activity just hung in the balance, when the movement to stabilise the currency and re-establish the gold mark standard sent prices bounding upwards.

This was the gloomy background of the Ruhr situation when the stage was set, after the abandonment of the passive resistance movement, for the painful struggle to revive the mechanism of industrial production. It is true that, in a short time, all the mines and works were again in operation, and that this continued for many months after the departure of the troops, while the loss of production during the period of idleness was made good. But wages were shockingly low—in many instances below the 1913 rates in gold marks, and therefore much less in actual purchasing power—and a twelve-hour working day was not uncommon. Even in the areas which had escaped the direct devastating effects of the occupation, and where the general conditions were not quite so bad as in the Ruhr, the wage levels remained low, and extreme poverty was widespread. All this was hidden from the casual

visitor to the cosmopolitan centres of the large cities.

Gradually wages began to be adjusted to the rising prices, and to that extent the demand for necessities of life slowly rose. This was soon met, however, and during 1925 the tendency was towards a heavy piling up of stocks, then towards short time and a steady growth in unemployment, which had fallen from about four millions at the beginning of 1924 to half a million at the end of that year, and to a quarter of a million by the late summer of 1925. While more people were employed during 1924 and the first half of 1925, the rate of individual productivity was low, and this was attributable chiefly to the impoverished and under-nourished condition of the workers, particularly in the coal-mines.

This low output caused high costs of production, which added to the difficulties of finance, reparations, falling demand, and the losses due to the accumulation of stocks. Short-time working drove up costs still higher, and at last, as we have shown in relation to particular industries, the alternatives of rationalisation or collapse compelled a decisive choice. The national banks had been charging up to 12 or 14 per cent. for loans, thus restricting credit to very narrow limits, and recourse to cheaper American money to finance the first rationalisation efforts was regarded at first as a questionable expedient to provide fuel for a gigantic industrial machine which was gradually running down for lack of it.

This, broadly sketched, is the picture of German industry between 1923 and the middle of 1925. Anyone now visiting for the first time the principal manufacturing centres, and particularly the Ruhr, would probably

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doubt its accuracy. It is nevertheless a moderate presentation of the facts, neither distorted nor highly coloured, and the extent of the contrast to-day is essentially the measure of the results of rationalisation.

Various causes have, of course, contributed to the revival in industry throughout Germany, and to the relatively quick recovery in many branches of the export trade. They could not have operated, however, except in the special circumstances of some of the less important trades, if the fundamental change in organisation, administration, and mechanical equipment, to make possible the simultaneous achievement of control of production and low overhead costs, had not been planned and carried out with a precision of aim and a speed and efficiency of action without parallel in European industry.

If the co-operative effort of the British people in the last stages of the war had been renewed in all its vigour and intensity of purpose between 1922 and 1926, to rebuild the basic industries on a sound economic and technical foundation, we should have witnessed a spectacle comparable to that exhibited in Westphalia and a few other industrial centres in Germany between 1924 and 1928.

The first outstanding effect was inevitably a rapid increase in unemployment. In every industry where the policy of re-equipment and increased mechanisation was adopted, to reduce costs of production, workers were dismissed in the early stages of the movement. The principal argument for rationalisation is that, in the face of present-day world competition, no industry can afford to carry redundant workers or unnecessarily high overhead costs ; that the defence of waste of effort

on the ground that it provides employment is a fallacy which is the more dangerous because it is commonly entertained ; and that only on a basis of the greatest efficiency attainable in the heavy industries can an enduring super-structure of miscellaneous industries be erected. Given this basis of efficiency and low costs, with a corresponding economical organisation in the works which use the raw materials, the conditions are created for a steady expansion of industrial activity, which will soon bring about, not only the re-absorption of the displaced workers, but the employment of the normal increase in the number of workers due to the growth of the population—always allowing for a margin of unemployment caused by unavoidable fluctuations in particular industries.

This argument, of course, raises issues of first-class importance in relation to the attitude of the workers to rationalisation, and to the balance of production for a home market which may be more or less controlled, and for an export market which is beyond control.

These are discussed later on. For the moment one simply records the statement that, in Germany, the argument seems to have been justified up to a point. That a very remarkable general revival did take place within two years, on a scale which astonished all observers who had intimate knowledge of the state of affairs in 1924, and that it could not have happened if policy had been determined by the assumption that something better would turn up sooner or later, is undeniable. What cannot yet be asserted dogmatically is that the revival is permanent : that its economic yield will be adequate to sustain the burden of taxes, social service contributions, and reparations payments, and

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at the same time raise the standard of life of the workers beyond the present level ; or that new and difficult problems will not arise in the rationalised industries. What may be asserted emphatically is that if rationalisation had not been carried out so efficiently and comprehensively, the standard of life of the mass of the people would have been very much lower than it is to-day.

The national unemployment figures give a broad indication of the trend of events. From the autumn of 1925 there was a rapid rise, as the normal seasonal causes, due to the effect of severe weather on land work, building, and so on, were reinforced by the heavy dismissals in the collieries, iron and steel works, and other works where the task of re-equipment was undertaken at this early stage. The number receiving unemployment "dole" was about a quarter of a million in September 1925. It was over a million at the end of the year, and it had rushed up to over two million in February 1926, a circumstance which fully accounted for the riots in the Ruhr at this time. In May the number unemployed in the Ruhr was five times greater than at the same time a year earlier, and in June, when the winter seasonal causes had completely ceased to operate, there were still 1,800,000 receiving benefit in the whole country. There was a gradual fall to 1,328,000 in August, and then the seasonal increase to 1,834,000 in January 1927.

During this time production was increasing rapidly in the principal industries, but the effect of new mechanisation was felt so quickly that for the most part the increase was achieved with fewer workers. It was not until a little later in 1927, when activity in nearly

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all industries increased rapidly, that the stage of re-absorption of displaced workers was passed, and a notable decline in the total number of unemployed set in. The exception was the coal industry, in which despite a very large increase in output over 1925, the number of workers did not again approach that of 1924-5, when the closing of uneconomic mines began. These surplus miners found employment gradually on the land, in the expanding building trade, in the iron and steel works, and elsewhere.

There was a marked decline in unemployment throughout 1927. The number receiving benefit fell from 987,000 in April to 341,000 in June, and 329,000 in October, when an early spell of sharp weather started the usual upward winter movement. By February 1928 there was a rise to 1,500,000, which was 500,000 less than at the same period in 1926, and 300,000 less than in 1927.

Having regard to the magnitude of these aggregate figures, which must, of course, be considered in relation to the total population of over 60,000,000, an examination of the percentage rate in the principal industries is enlightening. It serves to remind us that the effect of winter weather on outdoor work is much more severe in Germany than it is in this country—a fact which must be kept in mind when making comparisons. The total percentage was 10.5 at the end of February 1928. The rate in the coalfields, however, was only 2 per cent., this representing a slight fall from 2.3 per cent. in January. The rate in the textile trades was 3.6 per cent., and about 5 per cent. in the metal trades and transport. On the other hand, the building trade rate was 32.8 per cent., against 36.8 per cent. in January, while more

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than half the roof coverers and over a quarter of the painters were unemployed. Returns from employers in varied industries showed that, whereas 39 per cent. of the workers covered by the returns were affected by bad trade in 1927, only 21 per cent. were so affected in 1928.

The usual rapid spring decline was recorded in March and April. At the end of March the total percentage had fallen from 10.5 to 9.3, as compared with 11.8 at the end of March 1927. As seasonal work revived, the number again fell below the million, and at the end of April the total was 200,000 less than at the same time in 1927, and not far short of a million less than in 1926.

The outstanding features of the recovery in the principal industries have already been described in detail. It is only necessary here to summarise the main facts, to bring them to a focus, and relate them to the revival in the miscellaneous trades.

In the coal, iron and steel, and chemical industries the harvest of economies gradually accumulated from the beginning of 1926. They were attributable to the following causes :

The rise in individual output following the closing of the less efficient mines and works, the concentration of full-time production in those best adapted for preservation and extension, and the rapid progress in the modernisation of plant.

The steady improvement in the physique and morale of the workers with the rise in wages and standard of living.

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The elimination of duplicated activities and other forms of waste of labour and plant.

An immense aggregate reduction in transport costs, following the allocation of production to particular works for particular purposes, and the centralised control of the movement of raw materials and finished goods.

A progressive advance in fuel utilisation, and progress in general technical and scientific practice.

The further concentration of sales organisations.

As this harvest was gathered the arbitration tribunals were busily engaged in dealing with claims for higher wages and a reduction of working hours. By a series of compromise awards, usually operating for short periods, wages in the majority of industries were gradually raised to pre-war purchasing capacity, or very near to it, and substantial progress was made towards the general restoration of the eight-hour day.

In the meantime the reaction of these favourable effects of rationalisation in the "basic" industries on the miscellaneous manufacturing concerns was increasingly perceptible. The comprehensiveness of the modernisation of plant, and the adoption of new forms of labour-saving machinery, gave an immense stimulus to the electrical equipment, general engineering, and building trades. Employment expanded and wages were increased in these trades. The larger purchasing capacity of several million people, dependent directly or indirectly on the heavy industries, made itself felt in the textile, clothing, footwear, furnishing, pottery,

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and other trades. The demand for foodstuffs rose, and farmers were able to buy larger quantities of the new synthetic fertilisers, which were being produced and sold more cheaply, by the rationalised chemical industry. This led to still more intensive cultivation, and the demand for agricultural machinery was stimulated.

The growing network of overland cables from the rationalised power stations covered the countryside, and from towns, villages, and farms a new demand for electrical machinery and fittings of all kinds went forth. The reorganised works of the electrical equipment combines grew ever busier, and, with the full employment of their works, the capacity to export at sharply competitive prices steadily increased.

From these extensions of activity and employment there developed in turn an increasing demand for fuel and steel, leading to the notable expansion of production in the heavy industries during 1927. So the radiating waves of cause and effect, action and reaction, had extended throughout the whole of the industrial life of the country by the spring of 1928.

In considering wages it has to be kept in mind that the German rates before the war were less than the British, and that the post-war cost of living has not risen to the same extent. A general impression of the aggregate effect of the wage awards may be gathered from a return of the Federal Statistical Office, which showed that in January 1928 the average weekly wages in twelve important industries were 49s. 10d. for skilled workers and 37s. 6d. for unskilled workers. These averages include the amounts received by the relatively low-paid women workers, who are employed in large

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numbers in textile mills and in certain branches of the engineering trade. Woodworkers' wages averaged 51s. 5d. a week for skilled men and 44s. 5d. for unskilled, and mineworkers' earnings in all the coalfields—the rates being less in some of these than in the Ruhr—averaged 54s. 4d. for skilled men and 38s. 6d. for labourers.

Taking average hourly rates of pay, the amounts for January 1928 represent an increase of 52 per cent. for skilled men, and 86 per cent. for unskilled, with an increase in cost of living of just under 50 per cent. The levelling up of the wages of unskilled men, due very largely to the growing use of automatic machinery, has been an outstanding feature of industrial development in Germany during the past three or four years. The ratio of the unskilled average rate to the skilled rate rose from 59.7 per cent. in 1913 to about 73 per cent. at the beginning of 1928. The fact that in 1924, when gold mark wages had been restored, the skilled men's average hourly rate was only 16.5 per cent. above the pre-war rate, while the coal hewer's rate was actually just below the 1913 level, indicates clearly the extent to which the standard of life was raised throughout German industry in four years by the intensive reorganisation.

The achievement appears the more remarkable when the conditions in which the export trade was expanded, particularly in coal and steel, are examined. During the period of the British coal subsidy in 1925-6, and after the subsequent stoppage, the British owners and exporters cut prices drastically in the effort to recover lost markets. The Polish owners had adopted a similar policy, with the object of finding in the Scandinavian

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markets an outlet for the surplus which could not be used in Poland, and which was now excluded from East Germany, its natural market before the partition of Silesia. The Westphalian Syndicate was impelled into this price-cutting movement reluctantly, and within three months of the end of the British stoppage its quotations had to be reduced as much as 4s. a ton for some classes of coal.

The effect on the British industry is notorious. With few exceptions the owners were saddled with heavy losses throughout 1927, when the pressure of the difficulties compelled them to consider the formerly despised methods of corporate effort, contraction of the industry, and mechanical reorganisation as the only means by which the industry could be saved from bankruptcy.

In the Ruhr this price-cutting struggle was maintained, and substantial profits were made. Fair dividends were paid for 1927, and there could have been a larger distribution of profits but for the conservative policy of allocating much greater amounts for depreciation and re-equipment than is customary in Great Britain. Moreover, the intensive modernisation which was continued during 1927 and 1928⁸ was financed largely out of current revenue, and at the end of the year the principal companies exhibited a condition of financial soundness which would have appeared fantastic if predicted during the crisis of 1924-5.

For the iron and steel concerns the export conditions were equally difficult. As the directors of the Steel Trust pointed out in their report of March 1928, the export price problem was not limited to the iron and

steel sold directly to foreign buyers. Under the rebate system, all the German manufacturers using steel for the production of export goods were supplied at the world prices. The net effect, according to the report, was that the average price realised for this substantial proportion of the output was only 15 per cent. over the pre-war price.

Nevertheless, within three years of an acute crisis, in which the former separate undertakings were involved, the Trust could show a very large gross profit, write down plant by four million pounds, spend five millions in a year on modernisation and extensions, after closing down many of the older works and scrapping a large amount of plant which was more up-to-date than much that is still in use in Great Britain, pay one and a half millions for loan interest, and distribute a 6 per cent. dividend. More than that, the industry as a whole was able to pay a penalty, amounting to over 2s. per ton of raw steel produced, for exceeding its quota in the International Cartel, which gave a substantial bounty to France and Luxemburg, and to that extent strengthened the competitive position of these rivals.

The ability to withstand this fierce price competition in the export market, without forcing up the home prices to a point at which demand would be arrested, is attributable entirely to the large and varied economies realised by rationalisation.

It would be absurd to suggest that everybody, or even that anybody, was perfectly satisfied with the state of affairs at the beginning of 1928. The workers, reading the reports and accounts of the combines, and noting the unusually large amounts set aside for the consolidation of the financial position, were convinced that their

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share of the fruits of rationalisation was not adequate. Even the spectacle of the comparative position of the South Wales and Durham mine workers did not modify this belief in the mind of the fully employed Ruhr miners.

The shareholders, probably ignorant of the wistful yearnings of British holders of coal and iron and steel stock for a return of the golden era before 1920, contemplated with hostile feelings the gap between gross and net profits, represented by heavy writing down and contributions to reserves and reconstruction.

The directors and managers, comparing the wide difference in the cost of taxes and social burdens between the 1913 and 1927 figures, complained that the advance in social amelioration was far too rapid, and advocated a speedy return to more Spartan ways.

Much of the discussion at this period was undoubtedly influenced by a propaganda purpose. In November 1927, for instance, the Steel Trust directors issued a report definitely pessimistic in tone, which created some alarm among the shareholders and excited critical comment on the unsoundness of the financial position of the Trust. When expressions of astonishment were evoked by the revelation of the actual state of affairs five months later, it was recalled that the pessimistic report coincided with the decisive period in the consideration of the decree providing for the restoration of the eight-hour day throughout the industry.

It was not unnatural, therefore, that, in nearly all the annual reports in the heavy industries issued at the beginning of 1928, the comments on the growing burdens of high wages, shorter hours, taxes, social contributions, and reparations payments should be associated to some extent with the decision of the mine workers to

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terminate their agreement and to demand an increase in wages and a reduction in the working-shift.

When due allowance has been made for propaganda, however, the possibility of real difficulty arising cannot be denied. Even in normal times the problem of discovering the right basis of adjustment between wages, working hours, prices, profits, and provision for future development and efficiency could not be an easy one, even in a rationalised industry with central control firmly established, although it is certainly less difficult than in a state of chaotic competition, unreasoning price-cutting, and anarchic production, without consideration of the state of the markets.

In the coal industry the main mechanisation effort had been almost completed by the middle of 1927, and from that time the tendency was for costs imposed on the industry from without to absorb more and more of the savings from reorganisation. For this, however, the losses on the export trade, constituting, in effect, a huge aggregate financial gift to the industrial competitors of both Germany and Great Britain, was more clearly responsible than the domestic burdens. This was, indeed, the principal obstacle in the way of a higher standard of life for the workers based on the increase in efficiency and economy, or of an increase in profits, or of a reduction of inland prices which might be expected to stimulate a further general expansion of industry. For the solution of this problem, to the benefit of both the chief coal producing countries, the extension of "rational" and "rationed" control to the international sphere is obviously necessary.

In the iron and steel industry, where effective rationalisation was begun at a later stage, the end of the

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process is not yet in sight, and the full yield of economies has still to be gathered. Moreover, recent tendencies in the world market have been in the direction of higher prices. If these are maintained, and the gap of at least 25 per cent. between export and home prices which existed in Germany in 1927 is permanently narrowed, a substantial improvement in the present position may be looked for. What may be said with certainty is that, within two years, this industry will possess a competitive advantage, in the shape of a closely-knit central organisation, flexible machinery for the effective regulation of production in relation to demand, and a general average of technical and scientific equipment, far ahead of any of its European competitors.

CHAPTER IX

THE POSITION IN GREAT BRITAIN

Rationalisation was well under way in Germany, and its early fruits were already being gathered, long before any serious attention was given to the subject in Great Britain. So wide a departure from traditional British industrial methods does this policy imply that it was naturally regarded, by the majority of those who deigned to give it any consideration, as an alien and an undesirable thing, described by a word which nobody could understand.

Early advocacy of it was met by sceptical hostility, if not by scorn and derision. The analysis of international economic conditions, which was adduced as a justification for the policy, was rejected as unsound. The necessity for drastic change was denied. So far as the coal industry was concerned, all that was necessary was to reduce wages, extend working-hours, cut prices below productive costs for a time, endure consequent losses for a few months, and British supremacy would be once more established. Then it would be possible to increase prices, pay higher wages, distribute profits, and restore general prosperity. Never was conceived so fantastic a policy in relation to the realities of the world economic and industrial situation, the changes in fuel utilisation, and the organisation and equipment of competitive rivals, but it needed the futility and loss of a six

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months' stoppage and a further year of catastrophic experience to bring about even a partial admission that fundamental changes must be carried out.

Certain trade union leaders urged that comprehensive reorganisation in the basic industries was necessary, but there was obvious reluctance sometimes to accept all the implications of that policy, particularly in so far as it required a complete break with the section which held that, 'as the capitalist system was on the point of collapse, it would be folly to do anything that might buttress it up and prolong its precarious existence.

For a time the only outstanding industrialist to advocate rationalisation openly and without qualification was Lord Melchett. In the chemical industry he applied his own precepts in practice. He was the leader of the combine movement, and, once his great merger was carried through, he and those associated with him set about the task of reorganisation and expansion on much the same lines as the German Chemical Trust.

Hitherto in Great Britain the prosperity of the chemical industry had been based mainly on its world supremacy in the production of heavy alkalis, just as the German industry had been supported mainly by its supremacy in the production of dyestuffs. The policy of the Combine management was to maintain the alkali position ; to extend the manufacture of dyestuffs developed during and after the war by State aid ; to build up at Billingham on the Tees a great complex of synthetic nitrogen manufacture and associated processes, including the hydrogenation of coal to produce oil, on a scale comparable to the Leuna establishments of the German Trust ; to transform gradually the miscellaneous activities of the former separate concerns by

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scrapping the older buildings and plant, and specialising production on a full-time basis in new and modernised works ; and to concentrate and simplify the sales organisations.

Little indication of the progress of this rationalisation movement was given to those outside the inner circle of control. Occasionally a brief announcement would be made about the progress of the Billingham works, so far as the output of nitrogen and fertilisers was concerned, but silence was maintained about the other activities—especially about the reorganisation and concentration of the research departments and the work on which the chemists and engineers were engaged. In this respect the traditional reticence of the chemical industries was fully maintained.

In this industry, at any rate, the qualities which had built up the British supremacy in world trade during the nineteenth century—inventive genius, enterprise, willingness to take risks, initiative, and the capacity to plan ahead—were again finding full scope for expression. This was possible only in the new conditions created by the progress of scientific knowledge, engineering skill, and by world economic changes, which left for certain industries no choice save big-scale organisation or decline.

The awakening in the coalfields to the need for a fundamental change in policy did not come until nearly the end of 1927, by which time it was clear to all that the savings from the wage reductions and extension of hours had been swept away in the current of lower prices, and that, in addition, a heavy aggregate loss had been incurred. In South Wales alone this was estimated at over £2,000,000 for 1927, and in the early

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part of 1928 it was at the rate of £3,000,000 a year. Despite this appalling record the awakening was only partial, and the leaders of movements, in South Wales, Yorkshire, and the Midlands and Scotland, to inaugurate some form of co-operative effort encountered strong opposition at first from both colliery owners and exporters. Many who joined the associations formed to operate the various schemes did so, not because they were convinced of the wisdom of corporate action, but because their growing losses and the pressure of the banks left them no alternative except a prospect of bankruptcy.

Moreover, the time was not yet ripe even to gain consideration, not to speak of acceptance, of measures which could truly be described as constituting a rationalisation movement. The nearest approach was made in Scotland, where, in recent years, the owners have exhibited a progressive spirit above the British average, especially in the mechanisation of the mines to counteract the serious financial effect of geological disadvantages. The best that could be said for all the schemes was that they at least involved the abandonment of the policy of drift and a definite change of outlook, and that unless they broke down through lack of loyalty their operation would soon reveal the necessity for more comprehensive measures. In general, the situation in the early months of 1928 might be described as a spectacle of confused and anxious colliery owners, groping their way out of a morass of financial and administrative difficulties, led by a few far-seeing men with a fairly clear objective in mind, and buoyed up by the hope that, in due time, and not unlikely by devious ways, they would be able to prevail on their colleagues to follow them to the goal.

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In Durham, strange to say, departure from traditional methods even to this extent could not be recorded. Rigid individualism continued to prevail. As the losses piled up, with the failure to recapture the lost trade by successive heavy price-reductions, only the usual expedient was resorted to. Further wage-cuts were demanded and conceded by the independent chairmen of the conciliation boards, in Northumberland as well as Durham, to the astonishment and dismay of the men and their leaders. Earnings fell to the lowest point in Great Britain, and the poverty of the employed workers and their families deepened, while the turnover of the shopkeepers, already involved in financial difficulties declined still further.

The old centre of the industry was in the western part of these coalfields, and the course of development had been towards the coast. Consequently one finds in the western area many relatively small mines, old and inefficient by modern standards, more or less worked out. From here to the coast the standard gradually improves, and culminates in the large modern collieries with up-to-date equipment on the seaboard and within easy distance of the ports.

In the fierce competition of to-day the inland mines are heavily handicapped, while the modern coast mines, with good seams, low production costs, and minimum transport charges have immense advantages. Yet even these mines cannot escape some of the evil consequences of the general depression, and while co-operative action to regulate output and control a reorganisation process in orderly fashion could not prevent the permanent closing of many mines, it would substantially improve the prospects of those left in

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production and raise the standard of life of the workers employed in them. With few exceptions, however, this contention is firmly rejected by the owners, and apparently nothing short of the growing pressure, which seems likely to be created by the progressive action of the owners in other coalfields, will bring about a change of policy.

A brief summary of the aims and methods of the three co-operative schemes brings out clearly the tentative and halting character of the advance towards rationalisation, and the sharp contrast offered by the decisive, comprehensive, and dynamic plans by which the Ruhr industry has been so rapidly transformed.

The South Wales scheme was the first to be formulated and the most limited in its scope. It is operated by a body known as the South Wales Coal Marketing Association, and it covers about 90 per cent. of the output of the coalfield. No attempt is made to ration production or to regulate it specifically by any means.

The scheme provides for the formation of the collieries into groups, and for the fixing of minimum prices for the various grades of coal produced in each group. A contribution of 3*d.* per ton is made by all the members to a pool, from which compensation is paid up to 2*s.* per ton to those members who lose trade because of refusal to sell at lower prices than those fixed. On the other hand, those who sell at less than the fixed prices will be liable to a fine of 2*s.* a ton.

The belief was expressed by the promoters of the scheme that the compensation would itself tend to regulate output approximately to the market capacity, and to improve conditions generally by giving more

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regular work. Five months of discussion were necessary even before this limited scheme was formally adopted, and subsequent disagreement on various points has prevented any fair trial of its merits.

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This scheme was first devised by a group of leading owners in Yorkshire, Notts, and Derbyshire. Later, an invitation was issued to owners in other coalfields to join in the discussions, and, finally, the proposals were adopted by the three counties mentioned, with Lancashire, Staffordshire, Warwickshire, and all the other Midland districts. About 90 per cent. of the production of the whole area, or more than one hundred million tons a year, was covered by the members of the new coalfield marketing associations, which were formed to operate the scheme in the respective districts, and to co-operate through a central committee in its general administration.

It was the most comprehensive and far-reaching of the three schemes. Its primary aim was to re-establish the important export trade through the Humber ports, and to recapture lost trade, amounting to five or six million tons a year. The method was to impose a levy, not exceeding 3*d.* a ton, on the whole output of commercially disposable coal, and to subsidise from this fund the export sales in the markets where a price reduction might bring back the trade. The extent of the reductions made possible by the subsidy vary according to the market circumstances, and it was expected that, in the contest for the recovery of Scandinavian trade captured by Poland, the reduction might exceed 3*s.* a ton.

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The justification for the levy on coal intended for the home market was expressed in the argument that, if the export trade could be increased, the intensity of the competition in the inland market would be reduced, and that therefore all the owners would benefit.

The scheme goes much further than this, however, and the way to rationalisation is opened by the adoption of the quota method of regulating output. A "basic tonnage" is fixed for each colliery on the results of any year chosen by the owner, and from time to time an output quota represented by a percentage of this tonnage is fixed by a representative committee. A deficiency on the quota in any month may be carried forward, and, within a narrow limit, excess of production may also be carried forward to balance the deficiency, but provision is made to prevent or discourage constant excess production by imposing a fine of 3s. per ton on the excess above one per cent. of the quota.

The export subsidy part of the scheme is in charge of a special committee, which will work in association with the exporters and with a Shipping Bureau acting for the colliery companies. A firm determination was expressed by the promoters of the scheme to prevent any frittering away of the subsidy by the action of speculative exporters, who might prevent the producers from obtaining the full advantages they hoped and expected to gain. After some discussion, therefore, a representative body of the established Humber exporters entered into a provisional agreement to co-operate in the working of the scheme. Provision was made for effective supervision, for examination of

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contracts and other documents, and for the reference of disputed matters to an appropriate tribunal.

Only those who have intimate knowledge of the methods by which much of the export coal trade of Great Britain has been carried on can appreciate the significance of this agreement and the extent of the departure from old methods. Few of the exporters have taken this action willingly, and here again only the urgent pressure of economic and financial difficulties has been adequate as an impelling force.

The operation of the scheme raises important difficulties for the owners and managers, and many of them realise that success can only be attained if they go forward to full rationalisation. No standing still will be possible. There must be advance or retrogression, and the second alternative would imply a return to a much more disastrous state of affairs than that from which the scheme is intended to lift the industry.

Stage-by-stage advance is more likely. The quota output restriction will raise at once the question how to prevent short-time working, especially in the large, costly, and well-equipped mines of the new coalfields. The high overhead costs on a short-time basis will create an impossible position for these mines, and it will be necessary to concentrate the production on a full-time basis in the most remunerative seams. This difficulty may be overcome further by the closing of inefficient pits belonging to the same owners and the transference of the quotas to the larger ones, or even by the purchase of old mines to gain the advantage of the quota. In this way the amalgamation movement, which is necessary as a preliminary to full rationalisation, may be accelerated.

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Simultaneously, the extended use of labour-saving machinery, which is now being installed at some of the mines, will be more rapidly brought about, and from this it is only a step to the development of coal utilisation on a scale never before contemplated in Great Britain.

In the Scottish scheme the first definite step towards rationalisation is provided for, but other developments specifically laid down in the Northern scheme are left for the future. The object is to curtail production and to raise the prices of coal sold to certain classes of customers. Curtailment is achieved, not by a quota method which roughly places all mines on an equality, but by the provision of a fund from which owners who close down mines or seams by agreement will be compensated.

The levy is not to exceed 6d. per ton on all coal raised for the home market. A further levy is provided for, the amount being determined by the extra price which, in the opinion of the committee, should be charged to certain consumers, and the levy would only be imposed on the sales of such coal.

It cannot be doubted that in practice this scheme will create difficulties which will have to be met by an extension of it if success is to be attained.

The operation of all the schemes, in fact, will be experimental for some time, and the experience in each district will contribute something to a common pool from which, it may be hoped, a unified national

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coal policy will finally take form. This will involve complete rationalisation, both of production and distribution, as well as a revolution in pithead practice regarding coal as a raw material which the coal industry itself should use profitably. Rapid progress cannot be looked for at first. The heavy shackles of tradition cannot be thrown off so easily, and there must be slow and sure adaptation to new ways of thought and action.

The tentative schemes now coming into operation may be limited and inadequate, but apparently there was no other practicable way by which a vast mechanism of change could be built up. It is a great gain that men of outstanding ability in the industry have perceived the need for this change, and that they have given the lead which opens the way to progress. If, in this tentative fashion, we reach the stage at which the individual energy, which is now exercised in vain against world-wide economic circumstances, is directed with the same vigour, as part of a co-operative effort, to shape and modify those circumstances, a complete transformation of the coal industry and a gradual restoration of prosperity may be confidently looked for. The mentality of both mine owners and workers will certainly have to be transformed also, but, when men's minds begin to work along new lines for the solution of practical industrial problems, a wide change in outlook may take place almost without those who are affected being conscious of it.

In the iron and steel industry the necessity for a much closer grouping of interests, of control of

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production and prices, of the elimination of obsolete plant, and of modernisation on a wholesale scale, is realised by a minority of the owners and managers of the works, just as clearly as the group of colliery owners who took the lead in breaking away from routine ways saw the need for great changes in organisation. Nevertheless, there has been no comparable movement towards joint action, apart from the adoption of a rebate scheme to be applicable to manufacturers who pledged themselves to use only the products of the British works.

So far as any concerted effort in the direction of rationalisation is concerned there has been much discussion but no action. Two or three companies which, by virtue of a conservative financial policy in the past, and of certain other favourable circumstances, succeeded in maintaining a relatively strong financial position in spite of the depression, have undertaken an energetic programme of technical reconstruction. The great mass of British plant, however, remains admittedly far below American and German standards of efficiency. Much hard human toil, which is rendered completely unnecessary in the most modern plants, is still responsible for high labour costs in Great Britain. Valuable resources in the shape of coke oven and blast furnace gas are not utilised to their full capacity, and on many plants they are still largely wasted. The tenacious adherence to individualistic control involves enormous waste of transport effort and cost. The comparatively small proportion of the output which is produced on the continuous process system implies further large-scale waste of fuel.

The whole position was summed up recently by

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Professor William A. Bone, an acknowledged authority on the subject, in a terse declaration that resolute reorganisation of the works, greater control of fuel consumption, and recruitment of the higher management from "men of thorough scientific training, temperament, and enterprise," is the "only way of recuperation consistent with the national well-being.

"The full accomplishment of all these reforms," he added, "would doubtless require much co-operative effort throughout the industry, but it is a duty which it owes both to itself and the country, and nothing less will suffice. The daily systematic application of scientific principles to all factors of production is the best protection any industry can have."

The effect of reorganisation by the stronger companies may, however, hasten a wider movement on these lines by intensifying competition, which will be its first effect. The heavy commitments of many of the concerns, and especially large bank overdrafts, combine with the state of trade depression to increase the financial difficulties in the way of general reorganisation. Many millions would be needed to reconstruct the works on a scale comparable to the German achievement, but given the will to reorganise, and the creation of an effective centralised control, with a combination of the whole resources of the industry, these difficulties should not be insurmountable. Nor should it be necessary, as it was in Germany, to go to the United States for huge loans to finance the reorganisation.

The term "engineering industry" is used in Great Britain to cover an extremely diversified range of

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metal manufacturing activities. Among its varied branches there are many in which individual enterprise, adventure, experimental risk, and creative effort necessary for the development of new trades will continue to find full scope for a long time to come. In these special circumstances efficiency may be as easily attained by a highly specialised small-scale undertaking as by a powerful combine. In these branches, therefore, one may expect to be applied only those elements in general rationalisation policy which affect efficiency of plant and low production costs.

In other branches, mainly those engaged on big-scale production involving large works, costly plant, constant research, and keen competition with highly organised foreign rivals, the need for the full rationalisation programme is beginning to be realised. In the electrical equipment branch, for instance, the movement in this direction is already far advanced. A general agreement has been reached, by the principal concerns, for the pooling of information and research results, for the specialisation of plant, and the negotiation of joint contracts, so that the work may be allocated to the factories best adapted to deal with it.

It is true that the combination has been widely charged with a policy of maintaining inland prices at an unduly high level, but profits do not suggest that, on the balance of home and export prices, a state of excessive prosperity has yet been reached. It may be fairly argued that what has been done so far is only an approach to rationalisation, and that the very large economies which the German electrical trusts have undoubtedly achieved by concentration, technical

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modernisation, and sales organisation can only be attained in this country by similar measures.

Since the war there has been a remarkable expansion of the trade of the British concerns in the world's markets outside the Continent of Europe, even with the present organisation. This suggests the feasibility, not only of continued extension, but of a substantial improvement in the position of the workers, if the policy of fusion of interests, still greater specialisation, and the avoidance of duplicated effort, which now appears to be taking shape, is accelerated and applied with the definite purpose of reducing costs and prices.

The Vickers-Armstrong consolidation implied a reversal of the policy of amalgamation without regard to the suitability of the concerns for fusion and the efficiency of management of the associated works. This is a pointer which indicates a growing realisation of the conditions under which effective and successful rationalisation is possible in important sections of the engineering industry.

In the West Riding, the centre of the woollen textile trades, there is no indication whatever of a rationalisation movement. While the industry as a whole is depressed, and many concerns are beset with difficulties, there is still a sufficient leaven of relative prosperity to damp down any efforts to bring about large-scale co-operative effort. This district remains, and is likely to remain for some time, one of the last strongholds of the sturdy individualism which was the dominating factor in British industry throughout the nineteenth century, and the mainstay of the *laissez-faire* policy.

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In Lancashire the resistance to change is no less determined, but the crisis in the American spinning section of the cotton industry has become so acute during the past two years that the pressure of financial difficulty, coupled with a widespread fear of bankruptcy and collapse on a wholesale scale, is steadily breaking it down. Here, again, the owners of efficient and successful mills, which were kept out of the maelstrom of post-war speculation, and which have been consistently administered on a sound conservative financial basis, stand stubbornly in the way of complete co-operative action.

Yet the rationalisation movement gains strength steadily. An enormous loss of trade, due largely to the development of textile production in eastern lands, output capacity far in excess of demand, a complete failure of organised short-time working to solve the problem, the impossibility of reducing costs with all the mills in operation, and the admitted waste involved in the present methods of running the industry, are impelling those concerned along the way to rationalisation. The process means the permeation of entirely new ideas of corporate action among the most tenaciously individualistic men in industry, with the exception of their brethren of the West Riding. Swift progress cannot be expected, therefore, and even the proposed consolidation of one section of the spinning interests by large-scale amalgamation would leave important questions affecting the rationalisation of the industry, as a whole, entirely untouched.

There is no likelihood, for instance, of the development of a "vertical" organisation of the industry, as in Germany, where all the operations, from the

preparation of the raw material to the finishing of the fabrics for the market, are concentrated together. In Lancashire the processes of bleaching, dyeing, and printing are controlled by powerful combines, admittedly very efficient, but frankly organised as great sectional interests, and open to the charge that, by the exercise of monopoly powers in fixing prices for their work, they obstruct rather than co-operate in the creation of conditions which would make for the development and welfare of the industry as a whole.

It is a much disputed point whether the "vertical" system or the separation of the industry into separate departments is the more economical. The argument for the departmentalised system is the possibility of developing a higher degree of skill, and of reducing costs to a minimum by large-scale operation and the accumulation of sufficiently strong financial resources to enable plant to be kept thoroughly up to date. The argument for the combined undertaking is that, if the enterprise is organised on a sufficiently large scale, all the advantages just mentioned are attainable, in conjunction with the elimination of the heavy transport costs involved in carrying the woven material to the finishing works. The buildings of the combined concern in Germany are usually so arranged that the material flows from stage to stage with the least possible amount of human handling, the conveyor method being employed wherever possible to reduce labour costs.

To what extent the complicated transport which is inevitable in the Lancashire method adds to the final cost of the fabrics does not seem to be ascertainable. To a casual observer the spectacle of the lorry traffic involved in the transport of the unfinished cloth

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suggests a very heavy expenditure indeed. Although this might work out at a very small amount per yard of finished fabric, the aggregate amount, if it were possible by better organisation to save a large part of it, must be substantial.

In any event, it should not be impossible, given a stronger organisation of the spinning and weaving interests, to exercise such influence on the finishing combines as might lead to a much closer working arrangement between the sections. An obvious line of advance would be to arrange for such centralised co-operative control of production, finishing, and distribution that certain finishing works would be kept fully occupied in dealing with the output of certain manufacturing units, so arranged as to reduce the transport to the lowest point attainable.

Before this stage is reached the controllers of the Lancashire cotton industry will have travelled far from the mental attitude which still determines the attitude and action of the majority.

It has been suggested that at least 80,000 of the 570,000 workers in the industry are "redundant," but against this must be set the possibilities of a new expansion of a reorganised industry, given a wide revival in general trade, an increase in mass purchasing power, and a closer association between the cotton and artificial silk industries.

In the domain of power production the Electricity Board and the Electricity Commissioners, endowed with great and far-reaching powers, are steadily preparing the way for rationalisation, but it still

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remains doubtful whether progress can be either so rapid or so complete as it has been in Germany during the past five years.

The chief reason is that no clear-cut scheme has been practicable. A host of vested interests has had to be appeased. Rival claims of private companies and municipal authorities have had to be settled in general by compromise arrangements of the kind which are never perfectly satisfactory, and which often create new difficulties.

It will take several years to put out of action the scores of small uneconomic stations which have been destined for elimination in the schemes for controlling generation in the newly-created zones. There will be no centralised ownership of the capital stations, which will be the pivot of the system. Some will be municipally owned, others will belong to the companies. There may be, in the future, an evolution of a composite concentration of interests, similar to that of the Rhine-Westphalian system, but there is no sign of it at present, and, meanwhile, many important advantages of a common policy of direction and unity of purpose, extending throughout each zone system, will be unattainable.

In London particularly, where by special legislation the private companies are entrenched in their privileged position for many more years, the obstacles in the way of organising a completely unified system, operating in association with the adjacent production zone—such as that which has been developed by the co-operation of the Berlin municipality and the Reich—will be almost insuperable. There is no guarantee whatever that the existing anomalies in the price of current to consumers

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in adjacent suburbs will be abolished. Here, again, however, we see the peculiar difficulties, arising from the pioneer conditions in which manufacturing enterprises developed during last century, which have to be faced in this country in any movement for the modernisation of industrial methods, and the adaptation of our productive and distributive machinery to great changes in the economic conditions of the world.

Not so difficult, perhaps, but certainly not rapid, will be another development which will in time displace many gasworks, or make unnecessary extensions of many existing works, by the organisation of coke oven gas supplies. In this field also a tentative beginning has been made. In Durham, Sheffield, and South Wales contracts have been entered into between municipalities, gas companies, and individual colliery or coking companies for fixed supplies per day.

This is, of course, the most costly form of supply, as in each case special pipes must be constructed. For the fullest economies to be realised nothing less than a co-operative long-distance supply will suffice. By this means all the productive sources are linked up, the gas is accumulated in great containers at appropriate centres, with refining plant and the necessary machinery to pump it into the long-distance high-pressure mains. In this way a whole network of towns and villages over a wide area can be supplied at the lowest possible cost, and, while in the big cities ordinary gas-making plant may be retained as a precaution against breakdown, the numerous small and exceedingly costly plants scattered about the areas which might be served from the coking coalfields would become obsolete and unnecessary. The advantages of this extension of

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activities in a rationalised coal industry would be twofold—a substantial increase in revenue from a waste or semi-waste product for the industry, and much lower average prices for consumers, especially in those districts where the maximum of waste in gas manufacture is involved in the cost of transit of the coal and the inefficiency of the plant.

It will be gathered from this broad survey of the conditions in Great Britain that, while exceptional obstacles stand in the way of the attainment of full rationalisation and the advantages which have resulted from the process in Germany, certain progress has already been made. The way has also been opened for a further advance, even if it be slow and painful.

The chief of these obstacles are the appalling financial difficulties of many concerns in the staple industries which are most in need of rapid rationalisation; the tenacity of the old sturdy individualism, and the reticence about the affairs of a particular concern, which is inseparable from this mentality; the consequent innate hostility to the co-operative action, which is a fundamental condition of successful rationalisation; and the complex of vested interests, which must be composed or eliminated before effective corporate action can be organised.

In these circumstances there is no predisposition towards co-operative effort such as had been developed in Germany by the pre-war cartel system, and which alone made possible the swift rationalisation decisions and concentrated action when the crisis became acute throughout German industry during 1924-5. Only the

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heavy hand of adversity is pressing the British producers along this new road of industrial development. Therefore, progress at first is unwilling and halting.

One cannot doubt, however, that, as the novel ideas become more familiar, as it is more clearly understood what is involved in the coming changes and why they are imperatively necessary, British initiative will reassert itself and progress will be speeded up. The habit of working together will grow stronger by its exercise, and the limitations of the old individualistic methods will be better realised. The labour problem, which cannot be other than serious if the new movement is protracted and sporadic, is discussed in the next chapter.

CHAPTER X

THE CHOICE FOR LABOUR

The question of what should be the attitude of the trade unions, individual workers, and political labour to rationalisation brings us face to face with fundamental issues of Labour policy in relation to the capitalist system.

This will be clearly understood if the widely different views which find expression within the political and industrial labour movement in Great Britain are briefly examined. When, in the spring of 1928, Mr. Ramsay MacDonald stated that the present choice before the country was not simply between private enterprise and socialism, but that the immediate problem was the maintenance of such advantages as had flowed from competition, together with the preservation of individual initiative and national freedom under a system of combines, and vast aggregations of capital controlled by a few men, he was taking up a viewpoint which many of his followers have not yet discovered.

On the extreme left wing of the movement, both in the Labour Party and the trade unions, the belief is cherished that capitalism is not only decaying but that the collapse of the system may be expected at no distant time. This belief is based mainly on the present condition of the coal, iron and steel, shipbuilding, textile, and sections of the engineering industries in Great

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Britain. The imperfectly understood changes that have been wrought, and the advantages gained by rationalisation in Germany, are dismissed with the suggestion that, while a temporary improvement may be achieved, the ultimate result will be a more acute international competitive crisis and an acceleration of the process of decay.

The supposed impending collapse is not regarded by these people as a calamity to be avoided by every possible effort, but as something to be welcomed, for the reason that it will be possible rapidly and effectively to rebuild a Socialist State on the ruins. It is true that the belief is held only by a minority of men and women of influence in the movement, but if it were dominant in the determination of policy there would be strenuous opposition to all rationalisation movements within the framework of modern forms of capitalist ownership and control. There could be no conscious co-operation by the workers, or even passive acquiescence in such far-reaching changes as those described in preceding chapters. The aim would be to hasten the decline and fall, not to help to build supports for the tottering system, and so to prolong its existence.

Not far removed from those who hold this belief are others who maintain that ultimate collapse is inevitable, but do not appear to expect it to be imminent or sudden. The impelling motive of what has come to be known as the "Socialism in our time" policy is the desire to hasten by legislative and trade union action the attainment of a new social and industrial order, which may otherwise be long deferred. The aim of these leaders is to shorten the "transition period," and concentration on this task is insisted upon to the exclusion

of consideration of all "ameliorative" measures, which might divert the mind of the workers from the ultimate objective. The only remedy for unemployment and other social evils is the substitution of Socialism for the present system, and, therefore, only such measures as will actually create the conditions for substitution can be tolerated.

The desirability of "taking over" thoroughly efficient industries, assuming the Socialist State to be attainable, is not denied. If, however, rationalisation or any other measures bring about increased efficiency in depressed industries to the point of restoring profit-making capacity, the strength of capitalism as a system is renewed, and only gradual transformation can then be hoped for. For those who hold the views just described there is no escape from this dilemma. They must either acquiesce in the continued suffering of masses of workers and their families who are dependent on the industries which urgently need reorganisation; or they must provide "living incomes," as suggested in the "Socialism in our time" policy, out of national funds in the form of immense subsidies—taking the obvious risk, in a highly-organised State like Great Britain, of a powerful reaction against such a policy, comparable with the resistance to the general strike in 1926.

No such dilemma is offered to the increasing number of people who are not so confident that capitalism is tottering, or that the attainment of a completely Socialist State is possible within the lifetime of the present generation, who believe, on the contrary, that even in periods of the deepest depression the system may be modified and reshaped. The question for them is

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whether it is possible for the workers, acting through their trade unions, to influence the reshaping, or to gain stage by stage a definite share in the administration and control of industry. On the political side, the question is how far it is possible for the community as a whole, acting through Parliament, to institute safeguards against abuse of the immense power which is inevitably in the hands of those who do control the large-scale industries and commercial organisations now developing.

The issue here is clear cut and definite. If one believes that the capitalist system, which itself has evolved from former orders of economic and social life, is an entirely evil thing, that it is incapable of continued evolution, that the "capitalists" who control it belong to a special type of mankind which is actuated only by acquisitive and anti-social motives, that the system can be superseded completely by a scheme of national ownership and control planned in advance, and that no policy short of this is acceptable—then rationalisation or any other form of reorganisation which would strengthen and prolong the system must be rejected. Rationalisation and the attainment of efficiency in production and distribution must be deferred until the national ownership is established.

Those who take the opposite view do not accept the contention that the present industrial system will break down. They do see the possibility of a long-drawn-out depression, as in the coalfields, involving great masses of the people in the hardships of deep poverty, and many employers in serious financial difficulties leading even to bankruptcy. This does not result in a general collapse, but in a series of adaptation movements of the

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most painful kind. The weak go to the wall. The stronger survive. The more efficient concerns either crush out or absorb at bankruptcy prices the competitors less favourably placed, and after a long period conditions are stabilised on a new basis. In the interval, unemployment, under-employment, low wages, and widespread destitution have prevailed. The economic situation of the workers renders them impotent to resist the pressure of the employers when a further degradation of working conditions is demanded. Even where trade union organisation is fully maintained its power is diminished and membership is held with difficulty.

In the States of the ancient world a high degree of civilised and cultured life for a section could be based for generations on a mass of serf labour. In a modern industrial state like Great Britain it is possible for a certain proportion of poverty-stricken workers to drift on for a long time while an unregulated and ruthless process of the "survival of the fittest" is taking place, and at the same time to have a relatively high wage level in many miscellaneous trades and industries, together with a prosperous condition of the merchant and professional classes, and even of those engaged in the distribution of the products of the depressed industries.

The history of the industrial revolution furnishes many examples of this most agonising form of adaptation to new conditions. Hand workers who were superseded by the new power machines either lost their independence and entered the mills or languished in destitution. It is true that, so far as the number of people is concerned, the present crisis in the heavy industries and textiles is a more serious one, but the nation as a whole is relatively in a stronger position, not only to provide

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and finance palliative measures, but to oppose any revolt of the afflicted workers. The proof of this in 1926 is, in fact, the principal cause of the notable change in labour outlook and policy since that date.

Therefore, if this view of the probable effects of a slow and chaotic drift to a new capitalist basis in the distressed industries is accepted, it follows that, by opposing or retarding an organised reconstruction under the existing system, the ordeal of the workers may be lengthened and made more bitter. It follows also that despite opposition the reconstitution and stabilisation on the new basis will actually take place, but without the mitigating influences which a strong and united trade union movement might be able to exercise on the character of the reconstruction and the methods by which it is carried out.

This is the justification for the decision of the General Council of the Trade Union Congress to take part with Lord Melchett's group of employers in the discussions on industrial co-operation and all the important issues related to the problems of rationalisation. How far the Council will be able to convince the industrial movement as a whole of the wisdom of its decision is a matter for future revelation. The difficulty of the task undertaken cannot be exaggerated, and it will not be lessened until much of the existing confusion of thought on the subject has been removed. The principal obstacle in the way of progress is not the downright and implacable opposition of the Communist leaders outside the labour movement, or of those within the movement who regard any form of co-operation with capitalist employers as an indefensible compromise with the enemy.

It is the indifference or inertia of all those who do not

yet perceive that post-war economic conditions demand a sweeping change in the outlook and methods of all engaged in industry—employers, management, and workers alike. One instance will suffice to make this clear. If the full benefits of rationalisation are to be obtained there must be a reasonable modification of the complicated web of workshop customs, demarcation rules, restrictions as between craft and semi-skilled workers, traditional dislike of new labour-saving machinery, and so on. But if this modification is to be brought about without friction and trouble the change of attitude and policy is not to be limited to the workers. It must be at least as great on the part of employers and managers.

Careful research would show that all these restrictive customs were created for the protection of the workers against oppression or unfair dealing. So far as many of them are concerned the conditions which made them necessary and justifiable have been transformed, but the mentality of the majority of employers still leaves it permissible to believe that, without precise and effective guarantees, the workers would again be placed at a disadvantage if they abandoned these methods of protection.

Nevertheless, these restrictions must be included along with inefficiency in technical organisation, obsolete equipment, and unscientific methods, among the causes of high production costs, high prices, low wages, and low consuming power of the workers. Perhaps more clarification of thought is needed among all engaged in industry on this question of waste of human effort, high costs, and the standard of comfort and well-being attainable, even under the existing

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system, than on any other subject relating to industrial reorganisation.

The common assumption that the more people who are employed on a particular job, irrespective of cost, the better it is for the workers generally, and the less risk there is of unemployment, goes to the root of what is probably the most costly confusion of ideas to be found anywhere. Take, for instance, the basic industries of coal, iron, and steel. The cost of producing coal will be unnecessarily high if there are in the coal-mines many redundant workers, only employed partially and sporadically ; if, in conjunction with this, the organisation both of particular mines and of the industry as a whole is inefficient, and the equipment is old and costly to operate ; and if the influence of technical and scientific experts on the direction of the industry is weak and ineffective.

The cost of steel production will be raised in proportion by this cause alone, and, in addition, if the iron and steel works are likewise out of date and chaotically organised costs will be driven up still more. Therefore, either the workers in these industries will be compelled to receive very low wages and to endure a correspondingly low standard of life, or the high costs will be passed on in high prices to all who use coal and steel. As these are universal raw materials on which nearly all trades and industries depend in some form or other, the effect of the high costs, if passed on, will extend throughout the economic life of the nation. Moreover, as in each stage of the use and distribution of the raw materials and the articles produced from them a percentage is charged on turnover, the restrictive effect on the purchasing power of the consumer is

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cumulative, reaching finally to an amount far greater than the first avoidable addition to the cost of the raw material.

If this is realised we perceive the immense importance of the highest efficiency attainable in the basic raw material industries, and of the elimination of every form of unnecessary human effort and of waste due to uneconomical processes. This is the justification for the complete rationalisation of the heavy industries, including unification of control, consolidation of financial resources, concentration of production, re-equipment and the installation of every economical labour-saving device, flexible regulation of output in correspondence with demand, and the organisation of sales and distribution to eliminate all save absolutely necessary costs of transport and profit margins between the producer and consumer.

The relationship of miscellaneous trades to these rationalised industries, and the extension throughout the whole field of manufacture of the policy of low production costs achieved by efficient organisation and technique, high wages, low prices, and consequent increased purchasing power and expansion of output, are discussed in the next chapter. The immediate concern here is the attitude of labour to the measures necessary to restore the depressed industries, and to improve as rapidly as possible the living conditions of the large proportion of the population dependent directly or indirectly on these industries.

The employers' policy so far has been to keep prices low, not by efficient production, but by reducing wages. Hence, while certain other trades have derived temporary advantages, the purchasing power of

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millions of workers and their families has been reduced to the mere subsistence level. This has not only produced an appalling condition of poverty throughout the "black areas," but it has reacted finally on nearly all industrial and commercial concerns producing and distributing the necessities of life—food, clothing, footwear, household utensils, and so on. Consumption of all these things is seriously restricted, and the general unemployment problem is intensified.

Further, this low-wage policy without reorganisation has failed to prevent a steady increase in unemployment and under-employment in the coalfields. So long, therefore, as this policy continues there is not the slightest hope of any general improvement. The necessity for contraction and concentration of production has not been lessened by the extension of hours and low wages. The unemployed are in a desperate condition. The majority of those who remain at work must remain in poverty, with insufficient and precarious earnings, and the industries which produce the things these workers need but cannot buy are receiving no stimulus which might lead to an all-round revival.

Can it be contended in these circumstances that whatever temporary disadvantages or hardships might follow from rationalisation are likely to be more serious than the continuance of the existing conditions, and the inevitable ever-deepening destitution of the mass of people dependent on the industries, which must sooner or later be reorganised if they are to survive in the competition with the reconstructed industries of the Continent? Is it better that the number of workers who can no longer be carried economically by the coal industry shall be definitely determined, and that those

who are retained shall work full time, with a prospect of a gradual increase in wage rates, than that the present general conditions of precarious employment and low earnings shall be perpetuated ?

This brings us to the phase of the problem with which the workers and their leaders are naturally most deeply concerned, and the answer to the foregoing questions will depend on whether a narrow or comprehensive view is taken. In this terrible situation in which millions of workers and their families are placed it is not surprising that emotion and sentiment sway the judgment of all who are capable of deep feeling, but these alone will not avail to solve the problem. In no conceivable circumstances of human difficulty is it more imperatively necessary that decisions should be based on reason, and on a realistic relation of all the facts to the whole economic life of the nation.

If one's thought is concentrated on the conditions in a single industry the tendency will be to resist the changes that are necessary, because no ultimate alleviation of the hardships of the transition period will appear to be possible. The immediate effect of rationalisation in displacing more colliery workers will naturally overshadow all other considerations in the minds of the miners and their leaders. The conception of capitalist "ruthlessness" will be dominant.

If, however, we visualise the possibilities of economies, of stable full-time earnings, of higher wage rates, of steadily increasing purchasing power of the workers who are retained ; if we perceive the persistent radiating effect of this increased purchasing power, of the growing demand for machinery of all kinds as the process of mechanical re-equipment goes forward, of

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the consequent revival of miscellaneous industries, and of the stimulus to new enterprises ; and if, finally, we are convinced that rationalisation and reorganisation will be carried out in any event, we shall deem it wiser to try to influence and shape events than to engage in a futile struggle of resistance.

If rationalisation is actively opposed, or even if it is accepted, passively and with indifference, as the affair of employers who are thinking only of their own profits, the full advantages from the workers' point of view will not be obtained. Losses may just be turned into profit, but the wider benefits of higher wages, lower prices, and the favourable reaction of increased consuming power throughout the whole field of industry will not be realised to the fullest possible extent.

Modern mechanical equipment, which can only be installed at great capital cost, must be worked to full capacity. Otherwise the saving in labour costs will not be sufficient to meet the capital charges and to leave the necessary surplus for price reduction, or higher wages, or shorter working-hours by which the workers' standard of life is improved. Even a mild policy of "going slow," induced by antagonism to the changes involved in rationalisation, may eliminate the advantages which should be the workers' due. If, therefore, Labour policy is not to be one of determined opposition to rationalisation, based on the view that to strengthen the capitalist system is to perpetuate social and industrial evils which cannot be removed while the system endures, it should obviously aim at full co-operation with the object of gaining the greatest possible benefits for the workers and the community as a whole. Mere acquiescence, or passive resistance by

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individual workers, cannot prevent rationalisation, but would prevent the realisation of precisely those advantages which the workers, both as producers and consumers, could otherwise enjoy.

Given a policy of co-operation on terms, the trade unions would naturally insist on the fullest communal effort, directed by the Government, to institute special emergency measures to prevent hardship to displaced workers and their families, including all those who have suffered either continuously or sporadically throughout the period of depression. They would also demand that rationalisation should be carried out in all industries suitable for the process simultaneously and rapidly, so that the transition period might be shortened, and the stimulus to increased production on the new basis quickened by every possible means to bring about the re-absorption of workers displaced in the early stages of the process.

Another demand should certainly be the abolition of ring price-fixing arrangements based on restricted output to maintain high prices. In a rationalised industry such arrangements could only be regarded as anti-social. They put a premium on inefficiency and high production costs by ensuring profits to concerns whose organisation, management, equipment, and methods may fall far below the standards required by modern needs. In so far as they are allowed to continue, the process of expanding markets and increasing the standard of consumption of commodities of all kinds, which should follow naturally from rationalisation is sharply checked. Employment is restricted, and the absorption of workers displaced from the industries where contraction is necessary is delayed.

CHAPTER XI

GERMAN TRADE UNION POLICY

In the light of what has just been written we may now examine the new industrial policy—particularly in relation to rationalisation—adopted by the German trade union movement in 1926. This is explained in two documents. One is a manifesto on general economic and industrial problems, issued jointly at the beginning of the year by the German Federation of Trade Unions, and the organisations of officials and salaried employees. The other is a paper on the attitude of the workers to rationalisation by William Eggert, prepared for and endorsed by a conference of representatives of works councils, held in Berlin at the end of October 1926, under the auspices of the German General Federation of Trade Unions and the General Federation of Unions of Salaried Officials.

The clear-cut expression of views on rationalisation in these documents, in sharp contrast to the guarded and inconclusive comments frequently made on behalf of the British trade unions, is attributable to the fact that the German workers were faced with vast changes in process of accomplishment. In this country, discussion has been limited so far to hypothetical possibilities, to something that might happen. Consequently rationalisation has been regarded as a

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matter of theory, with which all manner of confused ideas might be associated.

In Germany, by 1926, as the writer of a foreword to Herr Eggert's discourse reminds his readers, "rationalisation of production is no more an empty phrase, but an accomplished fact which leaves no more scope to create shibboleths and words to mislead the workers."

"A contest against rationalisation," he adds, "would be tilting at windmills, and anyone who misleads the workers into such quixotic action, is either an ignorant person, who does not understand how industry is developing; or, if he does understand, is one who is consciously leading the workers into action which may well injure them, but cannot bring them the slightest benefit."

The joint general declaration of the General Federation of Trade Unions and the organisations of salaried employees and officials is as follows :

"Rationalisation is necessary. It is a task both for separate concerns and whole industries. Its aim must be a reduction in the costs of production and lower prices, together with a simultaneous increase in wages. Only by means of an increase in mass purchasing power created in this way can the workless become re-employed. The method, often practised at present, of rationalising without simultaneous lowering of prices and raising of wages must produce a crisis of over-production.

"The process of rationalisation must be carried through with the co-operation of works and economic councils, and with the avoidance of social hardships.

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“ The better use of labour power is to be promoted. The choice of directorship and management must be liberated from unessential influences.”

In a more detailed comment on the subject the following points are emphasised :

Agreement is expressed with the German Federation of Industry that rationalisation, in the sense of the employment of all technical and organisation means for the increase of productivity and the most effective use of labour and materials, is one of the most important factors in the improvement of the conditions of the whole community.

The workers must insist, however, that the increasing welfare of the masses must follow from this industrial development and its resulting improvement in the production process. Therefore, an increase in “ real ” wages must be demanded, so that with a higher purchasing power the market for goods may be extended, and new means of employment be created for the workers displaced in the process of rationalisation.

Only in this way can the more economical use of man power in the rationalised industries be tolerable. Moreover, if the highest production is to be attained by rationalisation and mechanisation, the individual effort of each workman is a most important factor. This full effort can only be gained by the payment of adequate wages, and by the co-operation of all concerned to create the psychological conditions in which there will be satisfaction in the work performed. For the achievement of this aim a much closer working together of the management, administrative officials, and the works councils is necessary.

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The fullest application of labour effort for the success of rationalisation can only be expected if the joint right to determine the development of the production process is admitted, and if sufficient means are provided to compensate for the social hardships which frequently result from rationalisation.

There is a danger in regarding rationalisation too much as an affair of the individual concern, and too little as a task for the whole of industry and commerce. If a group of works in the same industry expend capital on rationalisation without relation to each other the result may be an increase in productive capacity far in excess of the receptive capacity of the market. The modernised works cannot then be operated at full capacity, and one of two possible consequences must follow. Either the aim of lowering costs and prices cannot be realised, or the works will engage in sharp competition with each other, the weakest will go to the wall, and the capital sunk in rationalisation will be lost.

Therefore, to avoid such unwise direction and misapplication of the principles of rationalisation, it is necessary to consider thoroughly the importance and significance of rationalisation as a task for industry as a whole, with the aim of concentration of production at the places and in the works most favourably situated and equipped for the purpose. Any checks imposed by private interests on this process must be overcome, and joint councils, in which both the representatives of the workers and the management co-operate, must take part in the accomplishment of this grouping process.

As the aim of rationalisation must be an increase in the consumption and use of commodities, as well as an increase in production, so that the standard of life

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of the whole community may be raised, the raising of "real" wages is a vital necessity. From this point of view rationalisation has no meaning for the workers unless an extension of the market is assured. If it led to a shrinking of the market it would be folly.

Nevertheless, there are tendencies towards this foolishness. In numerous works it is perceptible that rationalisation is envisaged only as a technical problem of the intensification of labour, with no conception of the need for a reduction in prices or an increase in wages to prevent a falling off in consumption, which must otherwise result from the displacement of workers. If this tendency were to develop rationalisation must lead inevitably only to an increase in unemployment and to an intensification of the under-consumption crisis.

If, therefore, the workers pronounce in favour of rationalisation, it must be self-evidently on the supposition that its full economical and social aims are actually realised. In each case of accomplished rationalisation must a corresponding lowering of prices and increase in wages be achieved. It is not sufficient that these effects be held in prospect for a later time. They must follow stage by stage without delay.

The process of simplification and standardisation of types of goods is to be supported, but again only on the condition that, as this process leads naturally to an increase in mass production, a market must be created for the output, and that this is only possible by reducing the prices of all commodities, and making a corresponding increase in consumption possible. In this connection an adaptation of tariff policy, as well as lower prices and good quality, is essential.

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All efforts for the best possible achievements of the workers and officials are to be supported. To this end it is especially necessary to provide for the instruction of the unemployed, so that they may have a better chance of transference to new occupations.

In regard to works direction, rationalisation increases greatly the importance of the right selection of men for management in industry and commerce. The only consideration must be suitability and fitness. Opportunities of promotion must exist for all classes of workers. The system under which appointments to management rank are determined by relationship to former managers, or by influence, must be broken. Unessential motives for the choice of management create serious checks to the success of rationalisation, and produce unproductive burdens for the enterprises.

Concentration of production is regarded as an inevitable accompaniment of rationalisation. The fact that it must often result in the displacement of workers is held, however, to strengthen the demand for an adequate unemployment insurance, as a condition of the co-operation of the workers in the promotion of this form of reducing production costs. An extension of special production and business statistics is declared to be requisite for an effective study of all questions relating to rationalisation and concentration.

The general policy of many German cartels is strongly criticised on the ground that the aim is the maintenance of high prices, rather than the furtherance of productivity, particularly in industries under the protection of tariffs or import prohibitions. Even if the standpoint is taken that cartels should not be opposed on principle, but that only the misuse of their powers should be

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combated, it is none the less necessary that effective public control should be established over all monopoly organisations of this kind.

In the sphere of the distribution and sale of commodities, the adaptation of the principles of rationalisation is suggested with the object of abolishing all unnecessary tolls and artificial restraints on the sale of the largest possible quantity of goods at the lowest possible prices. To this end a wide extension of co-operative distribution is advocated, and the abolition of all forms of taxes which tend to restrict trade, and the increase of direct taxes on wealth and property, is demanded. In this demand is included the lowering of tariffs, especially on the import of raw material and essential foodstuffs. Finally, it is argued that, for the creation of purchasing power as the output of commodities is increased, a carefully planned credit system to meet the new conditions of industry is necessary.

The foregoing full summary of the official pronouncements of the German trade unions indicates clearly the policy adopted in the early stages of the rationalisation movement. The industrial, economic, and social point of view which determined this policy is expressed with equal directness and clarity in the following statement :

“ So long as the private enterprise industrial order exists it will produce economic classes which will struggle against each other to settle the respective shares of the proceeds of industry. We hold this struggle to be unavoidable, because an impartial scientific agreement on this question is not possible.

“ But without prejudice to this view we also believe

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that, for the solution of various economic, financial, social, and political problems, a joint effort by all parties is worth while with the object of overcoming the present crisis and developing the productive capacity of German industry.

“It is in this spirit that we set forth our demands to all who are responsible for German industry and policy, in the conviction that they show the way by which the restoration of German industry will be promoted and accelerated.”

There is no indication that the wider experiences of rationalisation, and its effects, especially since the end of 1926, have modified the policy of the German trade unions, except in so far as a cleavage between the workers and the employers on the question of higher wages and less working time has tended to become wider. To this is attributable the increasing number of strikes and lockouts as the financial results of rationalisation became perceptible in many important balance sheets in various industries during 1927. This raises a difficult question of general policy in relation to the reasonable allocation of the proceeds of industry, and to inland and export prices, which is discussed in the next chapter.

To the general statement of German trade union policy just given may be added a few notable comments by Herr Eggert in his discourse to the conference of works councils already mentioned. He stressed the point that rationalisation is an inevitable development of mechanical industry, and that in principle it is but a continuance of the persistent effort of mankind to

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discover and perfect aids to labour, evolving gradually from the simple tool to the machine, from the charcoal kiln of the woods to the modern blast-furnace, from the discovery of fire to steam and electrical power, from the tiny workshop to the great modern works, from the simplest organisation of industry to the complicated production apparatus of to-day.

While he found no important variation in the published definitions of rationalisation by the principal industrial organisations of Germany, he held that the trade union leaders were right to emphasise above all else the extension of the market and the improvement of the general well-being of the whole community as the two most important aims of rationalisation. If the process had the opposite effect, of limiting the market, it could only be regarded as a danger both to the working class and the nation. Because rationalisation affected so closely not only industry, but labour and the State, and also international industry, it was necessary that the workers especially should study the subject.

He declared that particularly the workers must combat the Communist view that rationalisation must not be demanded so long as the private enterprise system of industry existed. A simple study of the difficult economic position of a country which had to maintain a huge population on a relatively small area, and which must import a large part of its raw materials and necessary foodstuffs—possible only by the exchange of exports for the imports—would show how indefensible was such a notion from the standpoint of the working class. When it was further considered that out of the proceeds of exports the heavy burden of

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reparations must be borne, it was obvious that the necessary competitive power in the world's markets could only be sustained by the greatest possible technical progress.

While from this point of view it was important to extend the export market, it was still more important, in the interest of the whole nation, that the inland market and consumption capacity should be greatly extended, and that, by the cheaper production of a greater amount of commodities, the general standard of life should be raised. Only by rationalisation, directed specifically to the lowering of prices and the increase of the purchasing power of the people by the raising of the "real" wage level, could these two objects be attained.

This being so, to adopt the policy of refusing to be associated with rationalisation except under an entirely new industrial system, and to refrain from endeavouring to influence the operation of the rationalisation process, would be to play into the hands of those employers who stood for lower wages, an extension of working-hours, and the restriction, rather than the expansion of consuming capacity.

On the question of unemployment Herr Eggert reminded the conference that, in comparison with the pre-war period, the number of German workers had largely increased, owing to the growth of population, the reduction in the strength of the army and navy, and the entry of women into many new occupations. Hence, he suggested, the assumption that the serious unemployment crisis was mainly or solely the result of rationalisation was untenable.

"It is true," he said, "that one of the first effects of

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rationalisation has been a displacement of labour, but this heavy sacrifice for those concerned is far less than the working class would have had to endure if German industry had not been rationalised, that is, if the old condition of the production apparatus had been maintained. The competing countries would simply have stifled the German works, and would have brought the industry to an end. Especially for the workers would have been renewed the frightful miseries which they suffered during the war and the inflation period.

“To a good conclusion we must still go the way of rationalisation. The longer the process is postponed, or the longer it is extended, so much the greater must be the sacrifices of the workers. Even in a socialised industry rationalisation is necessary. The care for the unemployed is the obligation of the trade unions and of the community.”

Was it conceivable, he asked, that the German workers, officials, engineers, technicians, overseers, and others who were now within the ranks of the trade unions, should follow the example of the unorganised machine breakers in the early years of the last century, and resist technical progress and the application of scientific knowledge to industry? What a miserable standpoint was expressed by the slogan “Against rationalisation”! The continued development of mechanical industry, in which the workers of past generations had played their part, as well as the research workers and inventors, would not be arrested by opposition to rationalisation.

Labour policy, on the contrary, should be to support and carry it through even more intensively. Therefore,

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the workers must not oppose rationalisation, either openly or secretly. They must, on their own resolution, demand rationalisation, and use their organised strength to gain for the whole of the industrial population their due share of the advantages. In effect, it should be the purpose of the unions to make rationalisation of service to the whole community.

Finally, he contended that the effects of rationalisation called for the most persistent efforts to establish a universal eight-hour day as the maximum working-time, with overtime reduced to the lowest possible limit. This was justified, on the one hand, by the obligation to re-absorb the workers displaced by rationalisation, and, on the other, by the need for greater leisure, to counteract the deadening effect of automatic machine work, and the tedium of the movements of the "running band" and similar devices for speeding up mass production.

The conference endorsed these views, and expressed its conception of the scope and purpose of rationalisation, from the labour point of view, as follows :

"On the one side, the saving of time and labour power, reduction of costs, improvement in production, and the highest labour output. On the other side, lower prices, strengthening of purchasing power, increase in turnover, and the consequent expansion of the market."

The price policy of some of the cartels controlling the distribution of goods was condemned as tending to contrary results, and menacing the success of rationalisation.

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The German trade union attitude has been explained at some length, because the views set forth are undoubtedly endorsed by a large majority of the German workers, who have not merely acquiesced in the mechanical and technical reorganisation, but by personal effort have helped to gain the fullest productive results from the new plant and the new methods of working.

Despite the increasing tendency to engage in wages disputes there is no indication of any modification of the general policy, and the importance of this to British industry and to British workers lies in the fact that more and more will Germany reassert her position as the outstanding industrial competitor of Great Britain in Europe.

Moreover, the German policy is undoubtedly influencing the workers in other industrial countries where the question of rationalisation is now being closely studied. The resolutions on the subject adopted at the Congress of the International Federation of Trade Unions at Paris bore the unmistakable mark of German inspiration. "Rationalisation should only be supported"—to quote the salient passage—"on condition that representatives of the workers employed in the enterprise, or of the competent trade unions, invariably co-operate in its application, and that it shall be followed, step by step, by the raising of real wages and the resultant expansion of the market.

"When rationalisation is a purely technical measure, or a mere reform of organisation, without having as its economic effect the raising of real wages or an expansion of the market, it fosters unemployment and will

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become a cause of social evil instead of a source of economic prosperity."

The German trade union demand for the control of price-fixing cartels was also adopted by the Congress, as well as a declaration of the inland market policy in the following words :

"The increase, of the purchasing power of the great masses of the people and the consumers, either by lowering prices or by raising wages, or preferably by both these means, is the essential condition for the consumption of the mass goods produced by rationalised labour and economic processes, and this must be effected by trade union activity."

In a report on the subject the Belgian leader, Mr. Mertels, declared that the organisations affiliated to the Federation must "examine the greatest problems of production and consumption." They must ask whether it was possible to sell an increased output at the present costs of production, or whether there actually was sufficient production, or whether it was necessary to increase it. "We have ranged alongside of each other," he said, "the contrasting problems of over-production and under-consumption. The working class must really form a clear idea of the whole situation. There is no doubt that if we are to examine the problem thoroughly we must at the same time investigate the means of remedying the present situation, and then will arise the problem of the scientific organisation of Labour and rationalisation."

In March 1928 the National Economic Council of

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France, a body representing employers, workers, and consumers, decided to follow up a general survey of industrial and economic problems by a detailed inquiry into the separate branches of economic life, to ascertain how the principles of rationalisation might be applied to French conditions, and to what extent this form of reorganisation was necessary. Among the many special subjects for investigation specified by the Council were the improvement of the general conditions of production, the scientific organisation of labour, standardisation, technical equipment, relations between employers and workers, methods of sale and allied questions, the development of home and foreign markets, and the position of France in all these respects with that of other competing countries. The trade union leader, M. Jouhaux, assured the Council that the French national trade union centre would approve the reorganisation of industry in general, on condition that collective agreements were guaranteed as the recognised expression of liberty of association.

This attitude is of particular interest, in view of the fact that, in May 1928, the leaders of the iron and steel industry, both in France and Italy, came to the conclusion that rationalisation was the only solution of their problems of over-productive capacity in relation to demand.

These continental trade union views do not differ essentially from the policy of the American Federation of Labour, as stated by its president, William Green. "Labour is interested in the successful management of industry," he said, "because it reasons that with the introduction of economy processes, in the development of efficiency and increased production, the cost of

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manufacturing and production can be reduced without lowering the standard of the workers or reducing wages. Labour firmly believes that, if the cost of production of commodities must be lowered it should be accomplished through the promotion of efficiency in workmanship and management, the elimination of waste, and the introduction of economy processes. This belief is contrary to the old accepted rule of reasoning, which held that a lowering of the cost of production could only be brought about through a reduction in wages."

It has been much easier for the German trade union leaders than it can possibly be for the British leaders to formulate and publish a precise policy on a subject of such incalculable importance to the workers as rationalisation, in the sense in which the process has been considered in these pages. German industry, which was founded and developed rapidly when all the painful experiences of the British pioneer efforts were available for guidance and warning, has never been troubled with the complicated restrictions of workshop customs, craft demarcations, and immobility as between craft and unskilled workers, which still persist with undiminished effectiveness in many British works. In Germany, methods of computing wages are simpler, there is much greater interchangeability of labour, and the introduction of labour-saving machinery in every possible sphere has come to be regarded as a natural industrial development.

CHAPTER XII

UNEMPLOYMENT AND TRADE EXPANSION

A change in outlook and policy, without which the full advantages of rationalisation can certainly never be realised, is not a matter for decision by the trade unions and the workers alone. It is true that friction and divisions sometimes arise within the trade union movement from the conflict of interests between craft and general workers, the one class endeavouring to maintain its close preserve, the other perpetually striving to gain a higher standard of life and a better industrial status. This clash of interests will become still more pronounced as the use of automatic and "fool-proof" machinery becomes more general.

Nevertheless, the unions in which these respective classes of workers are organised will continue to act together as far as possible, and to prevent an open cleavage, for the simple reason that, under existing circumstances, all the workers believe that the predominant necessity is to organise against the employers. Suggestions by the employers that ancient customs and restrictions should be modified are usually interpreted as subtle efforts to lower the standards of the highly-skilled men by offering inadequate terms to the so-called unskilled or semi-skilled workers promoted to machine operations. How strong this feeling remains is indicated

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by the refusal of some sections of the shipbuilding workers to endorse proposals to reduce costs by abolishing rigid limits of craft labour, although these proposals were accompanied by definite guarantees that in every case of interchange the wage rates of the highest-paid craft would operate.

It is clear, therefore, that, until this apprehension that established standards will be undermined has been removed, there can be no free agreement on such changes in working customs, relations between craft and general workers, and the widest possible use of labour-saving machinery, as will ensure the necessary increase in production, lower costs, higher "real" wages, and larger consuming power, which alone can justify the process of rationalisation. Only if these results follow can the workers who are displaced in the early stages be adequately maintained, as they have a right to be, until they are reabsorbed, as industry generally is stimulated by the effects of the general reorganisation. For this reason a revolutionary change of policy on the part of many employers is even more necessary than on the part of the workers.

This problem of unemployment, created by the first effects of concentration of production by the closing of the less efficient works, and of the big-scale introduction of labour-saving machinery, is unquestionably the most difficult question to be faced by British labour leaders in formulating a policy on rationalisation. Especially is this the case in relation to the coal industry, which now differs fundamentally from others, so far as employment possibilities are concerned. The issue has to be faced realistically, and it must not be obscured by well-meaning but futile euphemistic efforts to show that

labour-saving does not mean displacement in certain conditions, but only "labour-aiding."

In coal-mines, as in other works, the introduction of modern mechanical equipment, does certainly *aid* labour, and it has also the welcome effect of abolishing much labour that can only be described as brute toil ; but, in the situation to which events have driven the industry, it just as certainly *saves* labour, in the sense of displacing a proportion of the workers. In so far as the first steps towards rationalisation have been taken in the British coal industry, by closing those mines and seams to which the heaviest losses were attributed, the inevitable effect of labour displacement on a substantial scale has created a violent prejudice against rationalisation among the mine workers, notwithstanding the insistent demand of their leaders for "reorganisation."

This shows on the one hand the confusion of thought on the subject ; and on the other the kind of difficulties that will arise if rationalisation is carried out in long-drawn-out stages, without any general plan or co-ordination, with no effort to secure the co-operation of the unions, and with no realisation of the obligation of the community, expressed through the Government, to restrict hardship to the narrowest limits and to mitigate by every possible means that which is inevitable.

In these circumstances it will be no enviable task for the General Council of the Trade Union Congress, or for the leaders of any particular union, to represent to the workers that the whole question must be approached from the viewpoint of the well-being of industry and the nation as a whole, rather than from the narrow outlook of purely sectional interests. The temptation to reply that, if this is so, the actions of the nation, the

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Government, and the employers must correspond with the needs revealed from this viewpoint, may well be too strong to be resisted.

For this reason it is all the more necessary to try to see exactly what the coal situation is. In time a development of the various processes for the extraction of oil from coal will probably bring about a large increase in demand, but on the basis of the most optimistic estimate of progress this cannot be expected to happen for some years. Even if all the remaining technical and organisation difficulties were quickly overcome the plant needed for converting many million tons of coal, a year can only be provided gradually.

Apart from this one likely development, bringing ultimate favourable changes for the industry, all the present discernible tendencies indicate further restriction rather than expansion during the next few years. In the discussions on the subject the substitution of oil for coal, for many purposes, and the rapid expansion of electricity services on the continent derived from water power and lignite, are usually stressed. Less attention is given to the almost universal movement for the more economical and scientific use of coal as a fuel. Both at British mines and in industrial works generally a very large proportion is still burnt in old-fashioned and wasteful furnaces.

For colliery operation alone there would be a saving of seven or eight million tons of good coal a year if all the old boiler plants were scrapped and modern furnaces were installed. This process is, in fact, going on steadily, and it will be accelerated as the impelling economic need for technical reorganisation is more clearly realised. Throughout the manufacturing industry

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also, and especially for electrical power production, the installation of the new types of boiler plant is going on rapidly. The effect on the colliery industry is not limited to the actual saving in the amount of fuel consumed. Low grade coal, and small stuff formerly left in the mines as unsaleable, have now become almost as useful for steam raising as the better quality and higher-priced coal.

When, further, we take into consideration the fact that the world's production of coal has substantially increased as compared with 1913, although the British output is 30,000,000 tons a year less, there is no ground for assuming that, until oil extraction is developed on a big scale, the British output can be much higher than 250,000,000 tons a year. Germany, France, Holland, Poland, and other countries which are developing their own coal industry intensively, are not likely to return to their former production level without a bitter and financially exhausting struggle.

Yet the total British capacity, if all the existing mines were operated full time, is well over 300,000,000 tons a year, and the continued exploitation of the rich new field of South Yorkshire and North Notts has still to be reckoned with.

Therefore, in an industry contracted to meet the actual market demand on a full-time production basis, and mechanised to the last degree to achieve the greatest possible saving in costs, as the only alternative to low wages, it is self-evident that the number of workers will be still further reduced, probably to round about 800,000. There is no other way to sound recovery even if the industry were nationalised. The choice is between this drastic "surgical operation" and the continuance

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of the existing conditions, with a very large proportion of the mining population enduring the miseries of unemployment, short-time working, and low earnings even for full time, without the slightest hope of improvement.

The suggestion is sometimes made that the immediate effect of closing mines, regulating output according to demand, and reducing the number of workers to a corresponding level, is as intolerable as the continuance of existing conditions. Therefore it is argued, the community must assume the responsibility of assisting the industry by subsidy, so that all the mines may be kept in operation and all the workers in employment. The emotional appeal of this argument to the workers is obvious, but it will not help to solve the problem.

Those who suggest this method have evidently no clear idea what they are driving at or what the proposal implies. To begin with, they entirely ignore the fact that rationalisation, carried out on an adequate scale and directed to the end of social well-being, would have the effect of raising substantially the standard of life of those left in the industry. In the second place, if the suggestion has any meaning at all it would involve the retention of 1,100,000 workers in the industry, at higher wage rates than those now paid. Consequently, if full time were worked there would be enormous over-production and stocking. If this were avoided short time for nearly all workers would be inevitable, and earnings would still remain inadequate. General poverty would persist throughout the coalfields.

Even a reversion to the seven-hour shift would still involve great over-production at full time, together with rising costs and a large subsidy, while a six-hour day

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would make necessary such a huge subsidy that any Government responsible for it would be swept away by the political reaction which would inevitably follow.

When the cost-saving results of the German coalfield rationalisation are dispassionately considered in the light of the conditions of the Ruhr miners in 1924-5, it cannot possibly be doubted that similar measures in this country, where on the whole the geological conditions and the quality of coal are much more favourable, would transform the financial position in two or three years. If, therefore, rationalisation were carried out effectively, whether in a nationalised industry, or by the necessary modification of the existing system of ownership, control, and sales organisation, the fact that the measures taken were placing the industry on a sound financial and productive basis would justify the use of national resources to whatever extent was necessary for the adequate help of the displaced workers and their families.

Special pensions for the older men, and the restriction of the entry of boys into the mines until the age of sixteen, with appropriate school courses and maintenance allowances where needed between fourteen and sixteen, have been advocated as obvious constructive measures which would help to solve the problem. The work of the Industrial Transfer Board would be another contribution, and for those who could not be affected immediately by any of these measures sufficient unemployment benefit to keep them above the poverty line would be a necessary anæsthetic to justify the surgical operation.

In essentials this is the policy embodied in the "immediate programme" adopted jointly by the Miners'

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Federation, the Trade Union Congress General Council and the Labour Party Executive, but its presentation to the country has been obscured and weakened by an apparent lack of unity of purpose. Only confusion is created in the public mind when simultaneously there is an insistent demand for reorganisation, modernisation of equipment, and organised selling, and an equally insistent condemnation of the colliery owners for callousness and ruthlessness when the first steps towards reorganisation and marketing reform are taken.

Criticism that the schemes so far formulated are too limited in scope, and must at first intensify competition between different coalfields, is entirely justified, and unless there is a speedy development of the plans, with a co-ordinating scheme to link up all the coalfields by a common policy, the maximum of hardship will certainly be caused. But it has to be kept in mind that the promoters of the schemes are for the most part men who are in advance of general opinion and inclination in the owners' ranks. Many old ideas and prejudices have yet to be thrown off, and mere abuse will not help the men who are trying to push the industry along into new ways.

The most effective trade union action would, therefore, be directed to persistent effort to accelerate the development of the schemes, to enlarge their scope and purpose, and to bring about the national co-ordination which is essential to success. Beyond this, all progressive opinion throughout the country could be rallied to maintain constant pressure on the Government to do its part, on behalf of the whole community, in preventing hardship and distributing a burden which should be commonly shared. Further, the need for simultaneous reorganisation and expansion of other

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staple industries, including agriculture—and especially for drastic changes in the production, price, and sales policy of miscellaneous industries—must be closely associated with the mining problem. Here we touch once more on the distinction between coal and other industries under post-war conditions. While it appears certain that for some time to come at any rate, the output of coal must be adapted to a restricted market, there is no reason whatever, save a refusal to adapt manufacturing processes to new conditions, why nearly all other industries should not expand continuously in correspondence with a rising demand for commodities made possible by cheaper production resulting from the higher efficiency attainable in organisation and equipment.

Steel offers an obvious example. If Germany's output could be increased by six or seven million tons in two years there is no very clear reason why a rapid advance could not be made in this country by a rationalised industry in which similar savings in production costs were realised. Moreover, we have not yet begun to comprehend in this country the extent to which home produced steel is being used as a substitute for imported timber in continental countries. In Germany, for instance, railway waggons and pit tubs are of steel. It is used much more extensively for supports in mines and for wire-carrying purposes. One of the latest developments is the use of steel railway sleepers, with which experiments were made for some time before they were adopted for general use.

The enormous demand for machinery and metal equipment of all kinds, set up when re-equipment takes place on a big scale, at once reacts both on the steel

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industry and on the general engineering trade. As industrial activity thus expands over a wide field the effect is felt to an extent that is self-evident in the food, textile, clothing, footwear, pottery, household, utensil and other trades producing the necessities and commoner amenities of life.

Despite the depression in certain sections of agriculture, and the hopeless attitude of many farmers, it may be maintained that, with a combination of reorganisation of marketing on the distributing side, and of electrification on the productive side, there is enormous scope for development of specialised foodstuff production. Co-operative action to simplify marketing and eliminate unnecessary intermediate tolls, the use of electrical machinery to eliminate mere drudgery work, the more extensive use of cultivation machinery and fertilisers, and the application of scientific methods recommended by the research stations may be justly compared to the rationalisation process in general industry.

Here, again, we see how closely interwoven is the whole fabric. Rationalisation in the coal, steel, and machinery and electrical equipment industries would produce cheaper equipment for agriculture. On the other hand, electrification of the countryside, and the provision of cheap current by a rationalised and unified electricity generating system, would create an enormous demand for manufactured products, and intensive cultivation would help to expand the new synthetic fertiliser industry. In short, the country would produce much more food for the towns, and the industrial centres would supply the country with manufactured products of all kinds to transform and

vary rural life, and dispense with much of the hardest rural toil.

It is from this wide viewpoint that rationalisation must be regarded, by trade unions and employers alike, if narrow and fallacious conceptions are to be avoided. It may well be that progress in this country will be slower and more difficult than in Germany, that blunders will be made, that some hardships will be caused that might be avoided. Resistance will not prevent these things happening, and may indeed increase the difficulties and the hardships. Progress is more likely to be rapid and comprehensive if the final goal is always kept in view, and if the relationship and interdependence of the different industries, so far as effective rationalisation is concerned, is the dominating factor in determining policy.

There is another important aspect of the question of introducing labour-saving machinery, apart from the immediate and transition effect on unemployment and its ultimate effect in reducing costs. It is the fashion, when speaking of some of the more complicated and wonderful types of automatic or semi-automatic machines, to suggest that men who tend them are being turned into robots, that pride in craftsmanship is being destroyed, and that the monotony of work will become unendurable. This is a typical example of a fallacious generalisation applied to an amazing variety of circumstances and conditions, and, as the introduction of labour-saving machinery on a scale which few people in Great Britain have yet envisaged is implied by complete rationalisation of the heavy industries, it is worth while to try to get a balanced view of this matter.

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One might imagine, from some of the facile and astonishingly ignorant appeals to prejudice one hears from time to time, that in the many works where old plant is still in use there is an unqualified joy in all kinds of brute toil, and that no minds are dulled by the tedium of monotonous work. A moment's consideration of the facts will show how absurd and misleading sweeping statements on a subject of this kind may be.

The truth is that an immense amount of merely laborious work ought to be, and certainly will be, abolished, and those who would be otherwise destined to spend their lives in doing it will have the least cause for regret. Think what is involved in two or three typical occupations in this category. In an old boiler-house men toil and sweat charging the furnaces and wheeling away the ashes. The workers engaged on a hand labour coking plant must charge the ovens, rake over the hot coke while the hose plays on it to cool it, and finally wheel it away in heavy barrows to the railway waggon. It is filthy work, carried on in an atmosphere of fumes and smoke and steam. In colliery work the "tramping" of the loaded tubs from the coal face to the main haulage road, and the ceaseless pushing and pulling of tubs on and off the cages and about the surface works, involve some of the most laborious work in a mine which lacks modern equipment.

There is nothing to be said in defence of this kind of work either from a human or social point of view. It is primitive. It is as monotonous as any single process on a running belt in a mass production engineering works. It reduces all but the strongest to a daily condition of physical weariness. At its worst it is degrading, and at

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its best its bodily and mental effects discourage any cultural efforts in leisure hours. The attitude of those who would like to see all modern industry break up, and a restoration of the pastoral life and handicrafts of the middle ages, can be understood. The attitude of people who believe that machine industry is firmly established, but who oppose the introduction of, toil-eliminating machines, is incomprehensible.

What is needed, of course, is a discriminating examination of the question. The mechanics or other attendants who patrol a modern boiler-house, free from smoke, dirt, and fumes, the men who operate the electrical machines by which a modern coking plant is entirely operated, the pithead worker who sits at a switchboard and controls the automatic devices which move the tubs from the cage, empty the coal on to the screens, and return the tubs to the cage, the engineer who controls the gigantic machines which scoop up two hundred tons of brown coal an hour, the men who operate the various kinds of conveyors, which have abolished an immense amount of pushing and lifting, are all using intelligence and skill. Their work is comparatively clean. They finish the day fresh enough physically and mentally to foster interests apart from their employment. They have a new status in industry which was never attainable by the old-type labourers, whose work has been transformed by the new machines. This change constitutes a definite stage in industrial evolution, and in due time it will bring the necessary adaptations in the training of youths and the arrangements for entrance into industrial work.

When we turn to consider some of the modern developments in miscellaneous factory work, the need for

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watchfulness and control is at once evident, but here also it is easy to exaggerate the effect of some of the changes associated with mass production and "scientific management." In the lighter branches of industry, as in the occupations just referred to, there has always been a great deal of tedious work, and even certain kinds of craft work become monotonous and mechanical. The task of the seamstress was more trying and tiring than that of the woman who works at a power machine in a clothing factory, and it is doubtful if the performance of a single operation on a running band or assembly line is really more tedious in itself than that of a clerk who is merely copying figures all day long. The number of workers who have an opportunity to develop their skill as a craftsman in such a way as to give real pleasure and pride in the work has always been relatively small.

It is possible, indeed, that with a great expansion of the use of automatic machines, some of which are extremely complicated, the number of skilled men, pattern makers, moulders, fitters, toolmakers, and supervisors will rapidly increase, while the machines will be operated more and more by men who, in the industrial stage from which we are now emerging, would have been labourers engaged in the unpleasant tasks just described. This work may still be monotonous, but it will be performed under infinitely more comfortable conditions, and it will be better paid.

Labour policy on these matters, which lie more or less on the fringe of rationalisation, would be futile if it took the line of resistance to these developments. They are as inevitable, regarded in the light of general industrial evolution, as the more fundamental changes brought

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about by full rationalisation. This does not imply that the trade unions must look on impotently. If they see clearly what it is possible and what it is impossible to do they will adapt their activities to the new conditions, and concentrate on the question of hours, undue speeding up, the prevention of adverse effects on health and nerves, and the promotion of such legislation as may be found necessary to protect the workers against abuse of the new power which scientific and technical progress in certain directions is placing in the hands of management.

No worker who tries to understand what is happening in industry, and the immense changes that will take place within the next few years in the structure and resources of capitalist enterprise, can doubt for a moment that the General Council of the Trade Union Congress has acted in the best interests of all the workers in participating with Lord Melchett's group of employers in the examination of the problems of reorganisation and industrial relations.

The trade unions cannot remain effective bodies unless they are able to change their methods and assume new responsibilities to correspond with the needs of a new era in industry. The leaders have to work out a definite policy, win the allegiance of the workers to it, and help to shape political-labour activity in conformity with it. This cannot be done without full and intimate knowledge of the new technique and processes. If an intensification of strife is to be avoided in rationalised industries, there must be not only a far-reaching change in the relations between employers and workers, but the present basis of trade union organisation and the relations of different groups of workers to each other

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will have to be re-examined and modified. When the discussions with the employers are concluded, whatever the concrete results may be, the leaders in the General Council will be infinitely better equipped for this difficult task than they could have been if they had missed the experience of discovering what is in the minds of the men on the other side who will be in the forefront of the rationalisation movement.

CHAPTER XIII

THE CLASH OF OLD AND NEW IDEAS

Although it is impossible to over-stress the importance of Labour's attitude to many questions associated with rationalisation, the policy of the employers will be the deciding factor in determining whether the process fails to yield beneficial results or whether it contributes to the welfare of industry, the workers, and the community alike.

Rationalisation may be a good or an evil thing according to the use that is made of it. What comes of it in this country will depend largely on the methods by which it is applied to British conditions, and the motives of those responsible for carrying it through. These considerations alone will finally influence both Labour policy and public sentiment.

Certainly one is not tempted, by a survey of the present position, to be over-optimistic. If there is confusion of thought among the workers and their leaders on the various issues of Labour policy discussed in the last chapter, it is at least matched by the chaotic mixture of ideas in the minds of the majority of the employers. The number who can be placed with Lord Melchett and his colleagues in the category of those who see clearly what they are aiming at and how they propose to attain their objective is very small. There are some

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who believe that, under a capitalist system which is capable of being modified by stages, it is possible to give practical expression to ideas of public service. They are far outnumbered by those who still cling tenaciously to the old conception that industry is primarily a matter for private profit, and that, even if it be badly organised and inefficient, it is the duty of the workers to accept without protest whatever "economic" wages and working conditions it can provide, however low the standard of life attainable under such conditions may be.

Deep-rooted ideas and habits of thought, which have persisted from the days of industrial *laissez-faire* and the sturdy individualism which carried men through when adventurous pioneer work was necessary, mingle with the newer conceptions of a changed economic world which demands corresponding changes in manufacturing methods and industrial relations. Reaction struggles vigorously and stubbornly against progressive tendencies. Even in Germany, where many of these traditional obstacles which hinder the advance to a better industrial order have not existed, the firmly established habit of co-operative action by the employers in a particular industry has not yet extended to general co-operation with the trade unions and the workers. Consequently, increasing labour disputes may arrest the flow of benefits from reorganisation.

It must be admitted, nevertheless, that a far greater shaking up of the old ideas has taken place recently on both sides in Great Britain than could have been thought possible two years ago. The candid discussions aroused by the deepening adversity in the heavy industries and the growing competitive power manifest

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in other countries have had a salutary effect. Complacent insularity has had a heavy shock, and in consequence the future of British industry is being envisaged more clearly in relation to the new world conditions. The belief that sooner or later we should float easily back to the relatively happy circumstances of 1913 has gradually withered, under the influence of a growing realisation that a vast process of adaptation must be carried through if the staple industries are to be restored to health and vigour.

The hope may be entertained, therefore, that the educative effect of these discussions and inquiries will not only give a new conception of responsibility and possible achievement to the trade unions, but change radically the outlook of those employers who are still living mentally in the middle of last century.

In the first stages of the pre-war industrial progress of Germany care was taken to avoid many of the blunders and evils which had left a trail of desolation across the earlier and even more remarkable development of British manufactures. In the post-war application of comprehensive rationalisation measures Germany has taken the lead, and mistakes have inevitably been made. It will be possible within the next two or three years to study this experience more closely, but already some fairly definite conclusions can be reached, and those engaged in British industry will have an opportunity of profiting by the experience in adapting the main principles of rationalisation to British conditions.

If this advantage is to be gained, however, a much clearer and more general conception of purpose and method must be formed without delay. How urgent this necessity is may be realised from a study of the first

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confused local efforts to reorganise the coal industry. There is a clash of divergent interests within the industry itself, and also between the industry and those who distribute its products. An alarming ignorance of what is happening in the other coal-producing countries is still manifest, and even more alarming is the indifference shown by many whose interest it should be to discover all the facts. On these lines there will be no avoidance of mistakes. On the contrary, unless impartial research is speeded up, and the knowledge gained thereby forms the basis of a uniform reorganisation policy, accepted and applied throughout the important industries with the greatest possible speed, the present disastrous confusion may become infinitely worse. The maximum good effects which rationalisation would yield under such conditions would be far more than counterbalanced by an extension of hopeless unemployment and its reaction on the mind of the workers.

In Germany there was no concerted policy throughout industry to begin with, but, as we have shown already, the stark necessity of escaping wholesale collapse compelled the employers in several of the largest industries to act swiftly and decisively, so that the general effect of simultaneous rationalisation on a common plan was actually secured without a common agreement. Moreover, the long pre-war experience of cartel organisation, and the pooling of resources which it involved, made it easier to adopt and apply the necessary measures. The later work of the Economic Advisory Board set up by the State has contributed much to the framing of a common policy for the application of the principles of rationalisation to other industries and to commerce,

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and here we have an example which might well be followed by the British Government.

The ingrained reluctance of British employers to work together for their mutual good may be removed by intensive educational activity, but this can only be organised by a national body, endowed with adequate funds and all the authority with which it is possible to invest it. Unless something of this kind is done quickly it will not be possible to transform and expand the present chaotic and inadequate rationalisation efforts into a comprehensive and well-directed movement.

The German employers were so far under the influence of pre-war conceptions of industrial relations that no effort was made to gain the active co-operation of the trade unions in applying the first measures of rationalisation, and there is still a wide divergence of view on wages, prices, and other important questions. Just as the employers were moved to act swiftly and ruthlessly by the pressure of financial and economic circumstances after the inflation and French occupation, so the destitute workers had no option in their desperate situation but to acquiesce passively in the employers' policy. Their leaders had to be content to give tacit support to the reorganisation, however ruthless it might be in its first effects on unemployment, in the belief that it would be better for the workers in the long run.

They took the view that productive capacity must be increased if the workers' standard of life was to be raised, and they had to concentrate their trade union efforts to gain higher wages as the costs of production were reduced. They demanded that the care of the displaced workers should be a communal obligation. They refrained from opposition to the displacement

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measures only because the rationalisation policy as a whole was likely to increase the efficiency of industry, lighten the toil and improve the conditions of the workers who remained employed, and finally create a general industrial 'situation in which it would be possible to restore normal average employment by expanding the output of miscellaneous commodities.

If this tacit support could have been fortified by active consultation and definite co-operation, much friction and loss resulting from subsequent disputes might possibly have been avoided. If British industrialists profit from this experience, many of the difficulties likely to obstruct rationalisation in this country may be removed. From this point of view the importance of the joint industrial conferences cannot be exaggerated. Two factors which do not exist in Great Britain contributed to the initial success of rationalisation in Germany, despite the lack of definite co-operation. One was the characteristic passivity of the German workers, their responsiveness to discipline, and their plodding, industrious habit. The other was the urge of the desperate state of poverty in which they were left at the end of the inflation period. The driving impulse to get work and keep it outweighed all other considerations.

In British industry there is nothing comparable save in the most distressed areas of the coalfields, and if the employers wish to get the best out of highly mechanised works they will have to adopt an enlightened policy in relation to the trade unions. There is no other way to gain the reciprocity necessary for the fullest success of rationalisation.

When an effort is made to reduce production costs by

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the concentration of works and large capital expenditure on mechanical equipment, the measure of success achieved, and the ability to pay higher wages or reduce prices, depends entirely on the margin of saving in labour costs on each unit of production. If this saving is not greater than the charges for interest on the capital expended, and for necessary provision for depreciation, there can be no advantage either for the employers, the workers, or the consumers. If, on the other hand, to take a concrete example, the labour cost of producing a ton of coal is reduced by 3s., while the capital charges and the cost of operating the improved equipment amount to only 2s., there will be a definite saving of a shilling to be distributed between profits, wages, and prices, according to the policy of those who control the industry.

Unless there is such an agreement on policy between employers and workers, with the co-operation implied by it, the willingness of the workers to make the best use of the machinery may not be secured or maintained. In a works modernised on the rationalisation plan a very small degree of slowing down on the part of the workers may not only destroy the margin of financial advantage, but actually cause a loss. For this reason alone it is obvious that employers who undertake such modernisation will best promote their own interests by advancing in harmony with the trade unions.

Two lines of approach to this harmony are clearly marked out. One is an understanding on the general principles which should determine the aims and methods of reorganisation, and this would, of course, provide for agreements between the employers and unions in each industry. The other has been indicated

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by Lord Melchett in connection with the system of works councils set up to maintain close contact between the direction and all classes of workers in the Chemical Combine. The disappearance of the old family type of business, with its personal relationship between employer and workers, seems to be inevitable in the heavy industries. If in the new order of large-scale production, the workers are to feel any living interest in the success of the undertaking, or to understand why there must be great changes in organisation and processes, there must be effective provision for constant contact and consultation through all the grades of management and supervision, linking finally the supreme direction with the men in the works.

The first line of approach has already been taken by the General Council of the Trade Union Congress and the employers' group. If the inquiry does not reach a stage of deadlock it will probably lead to the establishment of a joint national council with research and advisory functions. This body would be concerned with general principles and policy. The organisation of works councils, adapted to the circumstances of each industry, will be the business of the trade unions acting in association with the national advisory council. Some years ago Mr. Charles Renold, of Manchester, whose successful efforts to establish better relations through the evolution of both workers' and administrative councils ought to be much better known than it is, suggested unobtrusively that the development of this form of factory labour organisation, in close relationship with the trade unions, might ultimately yield a solution of some of the most difficult problems of industry, including that of workers' control.

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He envisaged the possibility, through the educative experience of the councils, of an advance to a joint governing body, composed of representatives of the higher management, the supervising and administrative staffs, and the workers. From this stage, he suggested further, it would not be a difficult step to a new conception of industry, in which management and workers in combination would hire capital at a fixed rate, instead of being themselves hired by capital. After meeting the capital charges the joint controlling body would itself decide the policy which should determine the distribution of the surplus as between producers and consumers.

To employers of the old school this will no doubt appear a fantastic idea, but, as will be shown presently, rationalisation is opening the way to such immense changes in organisation, over the whole field of the industries in which it is applied, that neither methods of administration nor the relations between employers and employed can remain unaffected. Once the conception of ordered control throughout an industry—governing production, distribution, sales policy, and labour conditions—is actually applied in practice—the conception of the purpose for which industry is organised and carried on may be profoundly modified.

Before touching further on this aspect of rationalisation, however, attention must be given to one or two questions of more immediate practical interest. Reference has been made to a divergency of view on wages policy between the German employers and the trade unions. This has a special importance for British industrialists and workers, owing to the similarity in

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the two countries, of the conditions which have produced the difference of opinion and policy.

In their definition of rationalisation, contained in the memorandum published in 1926, the German Federated Employers stressed mainly the use of all technical and organisation means to improve, increase, and lower the cost of production. There was no specific admission of any social purpose of improving the general standard of life of the community. Neither on the question of high wages or low prices was there general acceptance of the contention of the trade unions. On the contrary, so far as wages are concerned, it has been argued consistently that in Germany's economic situation low wages are necessary for economic recovery.

A typical viewpoint from which the purpose of rationalisation is regarded is indicated in a comment on the subject in an official publication dealing with the reorganisation of the coal industry. Following a description of the latest achievement in the modernisation of coking and by-product plants, and of the astonishing extent to which manual labour has been dispensed with, the general effect on the labour market is discussed. A substantial reduction of production costs and an increase of profit possibilities are frankly admitted. This result, it is also admitted, is first of all beneficial to the employer, to whose rationalisation efforts the saving is to be attributed.

Both his profit and his competitive capacity are raised, but it is contended that otherwise he would probably have been compelled to close the works, so that there would have been no employment at all for the workers. So far from this happening under

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rationalisation, however, the additional profits, turned partly into fluid capital, make it possible to extend the plant, and thereby to employ more labour. Therefore, the argument continues, this phase of rationalisation not only relieves the workers of the hardest forms of toil and raises them to a higher industrial status, but it is in the last resort the only means by which competitive power may be maintained.

This limited justification of rationalisation, which excludes the wider social and economic aims regarded, not only by the German trade unions, but by the Economic Advisory Board, as of primary importance, may be taken as fairly representative of the views of a large number of German employers. Many increases in wages conceded by the arbitration tribunals have been resisted until the Ministry of Labour has made them binding, such resistance being defended on the ground that the workers were absorbing all the savings from rationalisation and leaving no means for further development. Charges of bias against the tribunals and the Minister became more insistent during 1927, and opposition to the whole system, which may be described as one of compulsory arbitration with qualifications, was manifest on the employers' side.

In the industries dependent partly on export trade, and subject to the severe price-cutting competition which has been an outstanding feature of post-war European trade, the question of wages is naturally regarded in much the same way as that of prices. The employers' policy on both is opposed to that of the trade unions. In certain other industries, inland prices have been reduced on grounds of expediency. The Chemical Trust, for instance, took this line with the

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object of inducing farmers to use more synthetic fertilisers, and so ensuring the disposal of the constantly increasing output of the Leuna works. In the coal and iron and steel industries, however, the conditions of the export market determined price policy. While the inland prices fixed in 1925 were steadily maintained, despite the admitted substantial reduction in production costs, the exports prices fell lower and lower as the struggle for markets grew more intense.

The trade union leaders and some independent economists hold that the home market—which absorbs about 80 per cent. of both the coal and the steel output—should be the primary consideration in deciding price policy. Lower internal prices, it is argued, would stimulate home demand, especially for steel and goods manufactured from it. Thus, by keeping the works in operation at fullest capacity, the low production costs necessary to meet competition on the export market would be achieved.

The employers take up a directly opposite position. If the export trade is to be held, they suggest, prices must be fixed at the world level irrespective of the costs of production or the losses incurred in the struggle to hold the trade. The losses must be made good from the inland sales. This policy has, in fact, been applied both in Great Britain and in Germany, the only difference being that the British losses have been so heavy that the higher home prices have not been sufficient to counterbalance them. In Germany, during 1927, the margin between export and home prices of steel was as high as 25 per cent., until an upward movement in world prices was perceptible at the beginning of 1928. Export coal prices slumped rapidly

as the intensive competition of British exporters was developed after the stoppage, and it was stated that a certain amount of the Westphalian Syndicate business was held only at the sacrifice implied by prices as low as 5s. per ton below the cost of production.

This differentiation between home and export prices is held to be necessary and justified, on the ground that without the export trade the mines and steelworks could not be fully employed. Consequently, if part of the export trade were lost by attempting to stand out for higher prices, the reduction in the aggregate output would cause production costs to rise, and, so far from a decrease in the home prices being possible, it might be necessary to raise them still higher. The argument against higher wages is based on a similar reasoning about the necessity of maintaining the export trade at almost any cost, if a further contraction of the industries and increased unemployment is to be avoided.

To this, the trade unions and others who support their attitude reply that the relatively high internal prices imposed to compensate for the export losses limit consumption, check the general expansion of miscellaneous trades, and tend to perpetuate unemployment on an abnormal scale. At the moment there seems to be no possibility of harmonising these conflicting views, which indicate the intricacy of the problem. One German writer on the subject has pointed out that the comparatively easy solution open to the American manufacturers—the disposal of an expanding output in a home market stimulated by increasing purchasing power derived from higher “real” wages—is not possible to the same extent in Germany, where essential raw materials and foodstuffs must be imported and paid

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for by exports. Therefore, he suggests, it is only possible to provide for this trade balance, and meet the reparations payments which must also be derived in the last resort from foreign trade, by concentrating on both the export and the home market. Yet here, of course, comes in the difficulty of adjusting price and wage policies to two sets of circumstances so completely different in character.

Unquestionably, if the heavy losses on export sales could have been avoided, the effect of rationalisation on the German nation, as a whole would have been much more beneficial. To the price differentiation made necessary by the competitive struggle may be attributed mainly the check in the upward movement of purchasing power, and the consequent expansion of production in the miscellaneous trades, which was perceptible in the latter part of 1927. There was no evidence of any attempt by the cartellised industries to impose monopoly prices to any serious extent. The general tendency was for the cost of living to rise at the same rate as, or perhaps a little faster than, the "real" wage level in certain industries.

What had been actually accomplished by rationalisation at the beginning of 1928, therefore, was the restoration of the greater part of German industrial life from the position of 1923-4, when there was a very real peril of a general collapse, to one in which the standard of life was fairly comparable with that of the years immediately preceding the war.

Full allowance must be made for this astonishing recovery, and for the circumstances in which it has been achieved, if one is tempted to doubt the efficacy of rationalisation because it has not raised the general

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standard of life much higher in three years, or because it has left many important industrial and economic problems still to be solved.

The stage now reached is one in which much will be tested. It may be, having regard to the unprecedented situation in the export market of the heavy industries, that the trade unions have pushed their claims for higher wages too rapidly, with the result that the advance along the whole field of industry may be checked. Or it may be that the rationalisation measures still to be completed will bring further savings, sufficient to meet the increased labour costs. It is impossible to express a definite opinion in what is still a transition period.

In considering this complicated problem we are continually brought up against the difficulty which concerns Great Britain even more closely than Germany. That is, the excessive and unreasoning price-cutting in the coal export market, and the less serious, but important, competition in the steel trade. It must be kept in mind, in this connection, that the German industries, by rationalisation, had at least emerged, before the end of 1927, from the catastrophic situation of 1923-4 to a profit-making stage. Notwithstanding theoretical and propaganda discussions, the balance sheets for 1927, which have been referred to in earlier chapters, offer a sharp enough contrast to the position of the British industries. The German advance has been made while the disorganised British coal industry has fallen gradually deeper into financial difficulty, and the steel industry has been able only to maintain precariously its unenviable position.

From what has been written it follows that, even if the

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present tentative British movements towards rationalisation are co-ordinated and carried through to a much more effective stage, the fullest possible advantages cannot be looked for unless the export price problem is solved.

During the twelve months ending April 1928, this being the period of the most intense competition, the total loss suffered by the British and German coal industries, as a result of the sale of export coal at less than the cost of production, amounts to many millions of pounds. The continuance of a price policy, involving losses of such magnitude, can only be regarded as an astounding example of human folly, unless every possible expedient to bring it to an end has been tried. In Germany it has prevented both producers and consumers from realising all the advantages of rationalisation, and the immense expenditure of capital and effort in carrying it out. In Great Britain it has reduced a coalfield population of several millions to a level of poverty without a parallel in this country since the middle of last century.

The only solution possible seems to lie along the path of international agreement. If there was ever a need for "rational" control, to apply the latest interpretation of rationalisation, it is demonstrated here, both in the national and international sphere. In Germany the conditions for an approach to an agreement are already established. There is a single control of sales policy, and the heads of the Syndicate can negotiate for the whole industry. The first necessary step in this country, therefore, is to press forward with the coalfield marketing schemes to the stage at which a national policy can be formulated and expressed in action by a national

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committee. Simultaneously, the reorganisation of the industry must go forward with the double object of regulating output to the market demand, and reducing production costs to the lowest possible point.

If at this stage the necessity for definite contraction of the industry, pending developments in the processes for oil extraction from coal, is clearly realised, it should not be impossible to reach an international agreement—not to impose artificial restrictions and monopoly prices, but at least to insist on prices which would give a fair and reasonable return to the producers.

Until this solution is attained there is no likelihood either of a fair, economic price policy for the home market, or for a harmonious understanding on wages policy in either country, or for any substantial improvement in the position of the mining population in Great Britain, where rationalisation must, in any event, be a more difficult process than it was in Germany, and slower in yielding its benefits. At the Harpener meeting, referred to in an earlier chapter, Dr. Silverberg left no doubt as to the importance he attached to this question. He asserted that, failing an international agreement, which could not be reached until there was created on all sides the necessary opinion and organisation which would make a reasonable arrangement possible, the export price war must go on, and everything must be done, not merely to bring to a halt the movement for higher wages, but to increase the time of the working shift so as to bring the German miners to the same level as the British.

CHAPTER XIV

MONOPOLY OR COMMUNITY WELFARE

One important aspect of the subject of rationalisation is the extent to which it is possible to apply the principles to those industries and distributive agencies which do not naturally lend themselves to large-scale organisation, and in which it is desirable to preserve some scope for individual adventure. This can only be tested by experience. It is obvious that progress will be made first in those industries where depression and difficulty give a powerful impulse for change and reorganisation, but, as the results are observed, experiments will be made in other industries. So the process may be expected to spread gradually. If the community is to reap the full benefits of rationalisation, it is certainly necessary that all the miscellaneous industries shall be efficiently organised, and that the policy of the cheapest possible production, to be fully reflected in higher wages or lower prices, creating an increase in purchasing power, shall extend throughout the industrial sphere and transport organisation.

This must, of course, involve far-reaching changes in methods of sale and distribution, as well as the abandonment of monopoly rings organised to maintain high prices and profits on a restricted output, without regard to efficiency or economy in production. In fact,

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a complete reversal of the traditional policy upon which many groups of manufacturers and merchants still act would be necessary. Prices would have to be fixed on the basis of efficient production, with the primary object of fostering the largest possible sale and bringing about a steady expansion of manufacturing activities. The degree of rationalisation, and the methods by which the process was applied, would vary according to the circumstances of each industry or distributing organisation.

Where large-scale organisation and close control comparable to that attainable in the heavy industries is neither essential nor feasible, there could be, at any rate, a looser form of co-operation and voluntary adjustment of output in accordance with the state of the market, as ascertained through the operation of a reliable statistical service, created for this purpose, regarding stocks and demand.

An indispensable condition of successful evolution along these lines would be a mutual agreement, which could only be arrived at through co-operation, on the reasonable division of surplus revenue between interest on capital, wages, prices, depreciation, and provision for continued re-equipment and modernisation of plant to facilitate expansion of production as the standard of life gradually rose.

In the present state of confusion, and of conflicting interests and aims, there may appear to be little reason for assuming the possibility of developments of this kind. The conviction may be expressed, nevertheless, that unless radical changes in this direction do take place in British industrial organisation and commercial methods, it will become increasingly difficult to hold a

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fair share of the world's trade, or to reach a better standard of life for the workers, in face of the growing competition of other manufacturing nations which are less in thrall to tradition and more adaptable to new conditions.

The discussions at the World Economic Conference, where all the outstanding problems of industry, commerce, and finance were considered by an expert assembly representing all the interests concerned, indicated a wide recognition of the need for new conceptions of industrial methods and motives, and for immense changes in organisation to be carried out under the influence of these new conceptions.

In a general statement on the subject of rationalisation the Conference asserted "the urgent need of greater, more far-reaching, and better co-ordinated efforts in this field." The declaration proceeded as follows :

"While conscious of the advantages of rationalisation, both in the lowering of costs of production and of prices, and in expanding markets, the Conference has not been blind to the temporary unfavourable consequences which its application may involve in the case of certain categories of workers. Though, both directly and as consumers, the latter should in due course obtain their share of the advantages of a better organisation of production, they may be adversely affected for a time by temporary unemployment while readjustments are being made. In the following resolutions special account is taken of the legitimate anxiety which may be thus occasioned."

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In the resolutions mentioned the broad views of the Conference were set forth clearly, and the following points may be noted here as relevant to the issues discussed in the foregoing pages :

One of the principal means of increasing output, improving conditions of labour, and reducing costs of production, is to be found in the rational organisation of production and distribution.

The simultaneous aims of such rationalisation, in the opinion of the Conference, are :

“ To secure the maximum efficiency of labour with the minimum of effort

“ To facilitate by a reduction in the variety of patterns (where such variety offers no obvious advantage) the design, manufacture, use, and replacement of standardised parts.

“ To avoid waste of raw materials and power.

“ To simplify the distribution of goods.

“ To avoid in distribution unnecessary transport, burdensome financial charges, and the useless interposition of middlemen.”

The judicious and constant application of such rationalisation is calculated to secure :

“ To the community, greater stability and a higher standard in the conditions of life.

“ To the consumer, lower prices, and goods more carefully adapted to general requirements.

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“To the various classes of producers, higher and steadier remuneration to be equitably distributed among them.”

The point was stressed that care should be taken “not to injure the legitimate interests of the workers,” and to ensure suitable provision for cases where, through the first stage of rationalisation, the loss of employment is caused.

The Conference accordingly recommended that Governments, public institutions, and trade and industrial organisations should lead producers to initiate efforts along the lines indicated, and, in particular, that the following tasks should be undertaken :

The investigation and comparison of the best methods and most practical processes of rationalisation and scientific management, and the economic and social results obtained.

The application of rationalisation efforts throughout industry, agriculture, trade, and finance, to medium and small undertakings as well as to large ones, and even to individual workers and handicraftsmen.

The systematic standardisation, on both an international and national basis, of materials, parts, and products of all types which are of international importance, in order to remove the obstacles to production and trade which might arise from a purely national policy of standardisation.

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The institution of an international investigation to ascertain the best method employed and the most conclusive results obtained in every country in the application of the principles set forth in the resolutions.

The organisation of publicity to make known in all quarters the advantages and obligations involved in rationalisation and scientific management, as well as the possibility of their general achievement.

The Conference also suggested that special attention should be given to "measures of a kind calculated to ensure to the individual the best, the healthiest, and the most worthy employment, such as vocational selection, guidance, and training, the due allotment of time between work and leisure, methods of remuneration, giving the worker a fair share in the increase of output, and, generally, conditions of work and life favourable to the development and preservation of his personality."

The Conference further expressed the opinion that, in view of the importance of the question of rationalisation, the Economic Organisation of the League of Nations should keep in touch with the institutions specially concerned with the subject, and should include a note of its development in its reports on industrial conditions.

In reference to the research and propaganda work suggested by the Conference it may be noted here that the German State-supported Advisory Board and its associated committees are the only bodies yet created which are engaged fully in these comprehensive tasks.

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The American organisations set up under the influence of Mr. Hoover to promote standardisation and simplification, both in manufacture and commerce, have operated in a more limited sphere, which does not include the rationing of production, the close control of sales policy, and the ordered government of a whole industry even though it be not trustified, which are the distinctive features of German rationalisation.

The British Engineering Standards Association has done important national and international work, but within still narrower limits, and the body recently established under the influence of the Board of Trade to extend the standardisation movement is in no sense comparable, either in its representative importance, its influence, or the scope of its work, with the German organisation.

It is obvious that the experience gained by the Reichskuratorium, the rationalised German industries, and the American achievements of Mr. Hoover and the committees acting in collaboration with his Department of Commerce, was the main source of practical knowledge on which the Geneva Conference was able to draw when formulating its views and recommendations. It is no happy reflection on the state of British industry, after a century and a half of world leadership in manufacturing industry and invention, that its representatives should have been unable to contribute to discussions of such far-reaching importance any ideas or suggestions derived from practical experience in the new methods of organisation.

As one reflects first on the scope and results of the rationalisation measures carried out in Germany since 1925, and the wide extension of the process which,

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despite all difficulties, is likely to be achieved in that country in the near future ; and, secondly, on the recommendations of the World Economic Conference that similar measures should be applied throughout the whole field of industry and commerce in all manufacturing countries, one is naturally prompted to ask where the movement is likely to lead, and how far it will modify current thought on industrial and social problems.

In considering such questions one feels very much as a perplexed observer might have done when the introduction of power machinery was just beginning to transform the whole industrial organisation of the eighteenth century. Only surmise is possible. When two strong currents mingle there is a whirlpool confusion before they flow on again smoothly as a single stream. One cannot doubt that we are now in such a whirlpool, created by the clash of two currents of industrial and economic ideas. The old is contending with the new, and, in Great Britain more than in any country, where the old ideas struggle tenaciously to preserve their dominance, the onward movement is arrested for a time by the swirls and eddies of conflicting views and motives. Some minds are in bondage to the traditions of the past, and others are leaping forward to new ways of thought and action.

Under the circumstances this clash is inevitable, but only when the issue has been decided will it be possible to see more clearly the new kind of industrial and economic organisation which is now taking shape. Yet if policy is to be wisely determined by all concerned the leaders on both sides in industry must endeavour to see where events are likely to carry them.

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Even if the present outlook be obscure, it cannot be doubted that what we call, for convenience, the capitalist system is being gradually and painfully transformed. Neither the manner nor the nature of the transformation could have been foreseen before the war, and mainly for that reason the ideas which inspired the "advanced" political and industrial movements must now be realistically re-examined, and may have to be profoundly modified. Tendencies which had certainly begun to manifest themselves obscurely before 1914 were suspended by the emergency organisations of the war period, only to assume afterwards a more rapid development in the abnormal economic circumstances of the aftermath of the war.

It is easy to assert, as some do, that rationalisation is only a desperate expedient by which the industrialists hope to buttress up their tottering system, and that it will not only fail but will finally accelerate an international breakdown. This is facile assumption. It is much more likely that we are entering from the present unstabilised conditions another stage of an evolution, which will finally modify the system to such an extent that it will not be comparable in many respects with the private enterprise, capitalist organisation of the nineteenth century.

The trend of events in one country is not always a source of guidance in attempting to reach conclusions as to what is likely to follow from similar events in different circumstances, and with different reactions of national traditions and temperament in other countries. Nevertheless, the developments in Germany since the war, and particularly certain changes in the form of ownership and administration, both in public services

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and in ordinary productive industry, are sufficiently important to warrant the closest attention.

In the United States, which was less affected by the war than any European country, industrial evolution is still proceeding mainly on pre-war lines. There is expanding production for a growing market, with occasional indications of the possibility of future crisis. Only in the coal industry are the conditions comparable to those in Great Britain to-day and in Germany before rationalisation; with production capacity in excess of demand, short-time working, and unemployment, and generally a chaotic competition for the limited market.

In the steel industry, and in some branches of engineering in America, the pre-war type of trustification has been adapted to the rationalisation method of concentration of output in the best-equipped works, and the extreme modernisation of plant to make this concentration more effective. In America also there has been an interesting movement to experiment in new forms of industrial relations; but no attempt has yet been made to establish on the German plan definite control of the affairs of a whole industry, including strict regulation of output and sales as well as methods of production, by the co-operative action of all the firms or combines engaged in it. Except in the coal industry the need for concerted action carried to this point has not yet been felt, and it may be a very long time before the problem of adjusting production to both actual and potential demand reaches the acute stage into which the chief European industries have been precipitated by the effects of the war.

In the United States, therefore, we find no revolutionary change in industrial organisation of the kind

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which is implied by the rationalisation of the German coal, iron and steel, chemical, and electricity generating industries. It is this post-war movement towards complete centralised control from the more limited forms of pre-war cartel organisation which distinguishes the most important branches of German industry today from those in any other country.

Willingness to act together for certain specified purposes, and to pool resources to some extent for mutual benefit, was fostered among German industrialists by this cartel system in pre-war days. This has facilitated since the war a rapid advance towards complete unification of interests where circumstances have favoured this development, or to closer working arrangements where the maintenance of separate concerns with autonomy in management, within the limits of a general policy for the industry, has been considered the wiser and more practical policy.

Simultaneously, there has been a notable change affecting State or communally-owned enterprises. The establishment of the National Coal Council and the Economic Advisory Board, in close association with the Ministry of Economy, together with the growth of the system of industrial arbitration and binding awards, constitute a challenge to the doctrine that the State has no business to intervene in industrial affairs save when it is called on to arrange subsidies, transport privileges, or protective tariff measures.

The socialisation of the electricity generating industry in several of the territorial zones is an important post-war development, and even more significant is the experiment in industrial administration under State ownership which ensures the immunity of the direction

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and management from political influences. The normal capitalist method of forming a company and endowing the directors with full executive authority has been adopted, and those electricity undertakings which are fully socialised, as well as the State mines in the Ruhr and German Upper Silesia, are now administered in this manner.

In the Rhenish-Westphalian electricity undertaking a unique method of ownership has been established by the joint share-holding association of the municipal authorities, the Prussian State, and the various industrial companies which are closely linked up with the system. This may be described as a form of public utility company in an intermediate stage between private enterprise and socialism. It can hardly be doubted that, if a compromise between conflicting municipal and company interests was inevitable in the establishment of a national generating system in Great Britain, a simple and direct control over all stations in each zone by authorities established on this basis would have been preferable to the existing complicated method.

The R.W.E., like the purely State-owned concerns, is administered by a small board of expert salaried directors on strictly commercial lines, with the qualification that the relative influence of the shareholding groups ensures that public interests are the dominating consideration in the determination of policy. Interest on capital is limited, and the benefits of rationalisation have been divided among workers (including management and administrative staffs) and the consumers. The creation of this semi-socialised form of organisation is stressed because its financial and price policy may serve as an example to the rationalised and trustified industries.

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If it were true, as many people maintain, that the only incentive to efficiency in industry is the possibility of accumulating wealth, one would expect to find in the management of the large-scale undertakings, whether State-owned or operated by companies and trusts, the safe routine usually associated with officialism. One finds, on the contrary, to take the socialised electricity undertakings as an instance, that the directors, managers, engineers, and workers alike display the keenest interest in the achievement of efficiency records. Between the staffs of the different generating stations a spirit of competitive emulation finds expression in friendly strife, to show the best production results.

In the works of the combines and trusts, the method of "decentralised centralisation," by which a large measure of responsibility and executive authority is delegated to the group managements, evokes a similar keenness and rivalry to be credited with a high efficiency standard.

Another extremely important development is the tendency of the three basic industries—coal, iron and steel, and chemicals—to become more and more closely interlocked. Fusions and rationalisation, followed by strenuous endeavour to develop new processes in the chemical industry with coal as a raw material, and by new enterprises in the chemical use of coal by combinations of mine owners, have given a more definite shape to this movement in recent months. The possible implications and effects of closer co-operation between these three powerful industries, with an important extension into textiles through artificial silk, is discussed with increasing interest in German technical circles.

Already coal and iron and steel are so closely linked

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that the Steel Trust and the four largest independent firms, of which Krupps is the best known, control between them not far short of one half the total coal production of the Ruhr. The Chemical Trust has important interests in black coal as well as in lignite, and, apart from this, the bulk of the intermediate coal-tar products for the dyestuffs and pharmaceutical drug branches of the chemical industry are supplied by the Ruhr coking and by-product plants. The yearly output of the principal by-products in the Ruhr has recently been round about 600,000 tons of tar, 300,000 tons of sulphate of ammonia, 150,000 tons of tar pitch, 20,000 tons of heavy oil, 130,000 tons of benzol, 20,000 tons of toluol, and many thousand tons of various other oils and derivatives.

Until recently, the by-product activities of the colliery companies have been mainly complementary to the chemical industry, and the output of sulphate of ammonia has not been large enough to affect the synthetic products of the Chemical Trust. The position will be changed when the new colliery enterprise for the fixation of nitrogen from coke oven gas gets fully under way. As this process, according to the reserved statements published on the subject, is 'cheaper' than the ordinary synthetic method, a serious price struggle might follow the new Ruhr development if the colliery owners and the Chemical Trust became antagonistic competitors. It is regarded as much more likely that the ultimate outcome will be an agreement for mutual regulation of output and price-fixing.

Thus, we may envisage the growth of a closer partnership in this group of essential industries, fully rationalised, with immense financial resources, equipped with

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every type of labour-saving machine and device which the engineering industry can produce, and encouraging constant research and inventive experiment by the machine makers.

If the policy adopted by these compact and centrally controlled industries were monopolistic or anti-social in character, the power in the hands of a relatively small group of men would indeed be terrifying from the community point of view, and it would raise in the most acute form imaginable the question of State control. So far, there are no indications of such a tendency in the German development. On the other hand, there are positive indications that an evolution more in accord with public interest may be expected.

One of the consequences of the growing complexity of these industries, as their evolution is determined more and more by technical and scientific progress is a tendency towards the assumption of much greater control over policy by the salaried directors and managers charged with the responsibility of running the industries. The outside financier has less and less opportunity to insist on a policy in opposition to the development plans of the technical and scientific experts. This naturally leads to conservative finance, the limitation of dividends, and insistence on ample provision for sustained re-equipment and improvement of the productive apparatus. Moreover, the first essential of success in these concentrated and highly mechanised industries is continuity of full-time operation and the largest possible production in relation to the overhead costs. Hence any attempt to impose either monopoly prices which limited consumption, or labour conditions which aroused deep discontent

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among the workers, would speedily result in the diminution of the savings which should normally be secured by the reorganisation.

While, therefore, industrial relations and the conception of price policy still retain in some quarters something of the pre-war character, the possibility of a steady advance towards closer co-operation may be perceived, having regard on the one hand to the growing influence of salaried administrators, and on the other to the realistic view of industrial evolution taken by the trade union leaders. The scheme of works councils established by decree in the early days of the Republic has not been an unqualified success in practice so far. It was probably in advance of the general sentiment of the time, and, in many works, the managers have given no encouragement whatever to this tentative experiment in industrial democracy. In others, interesting and significant results have been recorded, to the mutual advantage of employers and workers. It is not unlikely that the importance of these bodies will be recognised more readily in the rationalised industries, having regard to the necessity for harmonious relations of both higher individual output and aggregate production, without which the expenditure on modern plant cannot be justified, are to be achieved. Moreover, the trade unions recognised from the beginning of the scheme that, if the work of the councils was to be effective, they must be composed of men specially equipped for the task. They have organised training centres and courses of lectures on economic and technical subjects, so that the officials of the unions, as well as the members of the works councils, may be better fitted to discuss on equal terms with the managers

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the many difficult questions that now arise in connection with labour interests.

How far it may be possible for industries organised in this manner to control or modify some of the "laws" which the older economists were disposed to regard as immutable, time alone can show. It does seem possible, however, that a flexible regulation of output throughout a series of industries, according to the actual market needs of the moment, should tend to level out the curve of booms and slumps. The prevention of over-production, and the maintenance of prices on a stable level irrespective of temporary variations in demand, creates a situation radically different from the state of affairs when a host of producers are operating in ignorance of the state of the market, and competing fiercely for such trade as is available.

The experience of the Westphalian Coal Syndicate is interesting from this point of view. For many years before the war, prices were varied within very narrow limits, and it was claimed that the assurance of stabilised fuel price conditions contributed largely to the confidence with which the steel firms pressed forward with their plans of expansion. For three years preceding the increase permitted after the wages award of April 1928, the inland prices of coal had hardly varied, and throughout the British stoppage of 1926, German prices in the "uncontested" or non-competitive areas remained unchanged, despite the enormous demand for coal and the high prices obtainable on the export market.

An extension of control on these lines throughout the principal industries must involve, so far as Great Britain is concerned, not only a revolutionary change in

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merchānting arrangements and interests, but a substantial modification of the traditional conceptions of the operation of the law of supply and demand and the effect on prices of fluctuations in demand. It can hardly be doubted, also, that, given the evolution of effective centralised control of production in the staple industries, the relations between the leaders of these industries and the bankers, in regard to credit policy, will have to be reconsidered in the light of new conditions and new needs.

All these possible consequences of rationalisation must remain obscure until practical experience has been gained. The most important question of immediate interest in Great Britain is whether reorganisation as comprehensive as that which has taken place in Germany can be carried through in time to prevent a still more acute crisis in the heavy industries and in sections of the textile industry. The difficulty in securing agreement on the South Wales coal marketing scheme ; the increase in unemployment in Yorkshire, the Midlands, and Scotland, following the output restriction, without any corresponding move in other industries likely to bring about an expansion of trade ; the persistent unwillingness of many steel firms to merge their own menaced interests in a general effort for the common good ; and the latest manifestation of an easy-going low-wage policy by an important section of the cotton employers, do not induce a feeling of optimism.

On the other hand, the necessity of rationalisation is now being urged with increasing forcefulness by those employers who have realised the futility of old methods in the present condition of world manufacture and

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trade. An illuminating commentary on Britain's industrial needs may also be confidently looked for as a result of the discussions between the General Council of the Trade Union Congress and the employers' group.

If one takes a wide survey of the position it is hardly possible to doubt that, if British industry as a whole can throw off the shackles of outworn traditions, advance along the lines dictated by technical and scientific requirements, and contribute to co-operative effort all the experience and ability which have been accumulated during a century of pioneer enterprise, it will be possible to recapture a first place in world leadership. The outstanding supremacy of the pre-war years can never be regained, but this does not imply that progress, far transcending the achievements of the nineteenth century, cannot be made. It is true that the extremely individualistic development of British industry has not so far produced many men with the experience of large scale management that has been gained in America and Germany, but some of the post-war achievements prove that, given the opportunity and the right conditions, we have no lack of able managers who can rapidly adapt themselves to more difficult tasks and wider responsibility.

Nor do we lack skill and ability for development in the technical and scientific branches of industry. The outstanding achievements of the past few years in motor manufacture, aviation, and electrical equipment enterprises—above all, in the rapid development of the new synthetic processes by the Chemical Combine, and of the new methods of artificial-silk manufacture, show that, where scope and freedom are given for

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initiative and practical experiment, British industrial leaders and workers can meet the challenge of any rivals.

Finally, it may be suggested, that British labour through the trade union movement, will take a much more important part in the coming industrial revolution than has been the case either in Germany or America so far. In Germany, as we have shown, the workers have had no option but to acquiesce in the immense changes which have saved the industries in that country from collapse, and the trade unions have still to gain a definite place in industrial government.

In Great Britain the preliminary joint discussions aiming at a full understanding on the conditions which should govern rationalisation; the labour policy adopted by the Chemical Combine; the railway co-operation movement initiated by Sir Josiah Stamp; the enlightened labour policy of the London Omnibus and Underground Railway Combine; and other less spectacular but important tendencies, all indicate the possibility that Great Britain may again lead the world to a further stage in the evolution of industrial democracy.

If the fullest advantage is to be gained from completely rationalised and mechanised industries in this country, there must be willing co-operation, and not merely passive acceptance of the new conditions, by the trade unions and the workmen. The tangle of traditional methods will have to be straightened out by both sides, and this can only be done by a policy of mutual concessions and guarantees.

Never before has the trade union movement been faced with so clear and momentous a choice. There is

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certainly risk in leaving the safe ways that are known, but some of the most influential leaders have reached the conclusion that the dangers of moving forward on a fresh line of advance, and the assumption of greater responsibilities, are far less than the peril of ineffectiveness and decline if future activity is to be limited by the mental outlook of the past.

With greater responsibility will come infinitely wider opportunity. If the trade unions are to be fitted for the one, and able to grasp the other, there must be intensive study, on a scale not yet imagined by many officials, of economic, financial, technical, and scientific developments in every important industrial country. This task may be undertaken by the central organisation of the movement, or in co-operation with the employers through some national joint organisation. Whatever the method, the accomplishment of the task is an essential condition of the ability of the workers, through their chosen leaders, to help to shape the new industrial revolution that is now beginning.

From the community point of view the problem created by rationalisation is how to gain all the benefits of large-scale organisation of industry, and the highest possible efficiency in production and distribution, while avoiding the evils of monopoly control. The problem is not to be solved by insistent declarations that nothing can be satisfactory until complete nationalisation is achieved. It may be that events will sooner or later compel the assumption of full State control over rail transport, electricity production, and even the coal industry. But no one who studies the whole industrial situation realistically can believe that, within any measurable time, the sphere of State

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ownership and control can be extended to include the wide field of complicated manufacturing industries.

The immense changes which appear to be inevitable in these industries, and the effect of the changes on the community, will be determined, partly by the employers and the trade unions, and partly by the cumulative pressure of world economic tendencies. If this view is accepted it is hardly possible to over-stress the importance of the decisions that must be taken by both parties in this critical testing-time of transition.

