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Scientific management and planning

Drawing upon a wide range of historical sources, Chris Nyland argues that the Taylorist system of work organisation has been too hastily dismissed by Marxist and other commentators from the left. The author thus suggests that socialists should re-evaluate the potentialities of scientific management, and harness the techniques of planning and systematic work scheduling for the benefit of the working class.

● It is widely known that in early 1918, Lenin called for the broad adoption of Taylorism within the Soviet Union. Lenin's positive, even if qualified endorsement of scientific management has been variously interpreted as either an example of his desire to gain dictatorial control over the working class or as merely a necessary action forced upon him by the urgent need to raise productivity within the USSR. In this paper it is argued that such explanations are either grossly inadequate or simply invalid. It is suggested they are based on a narrow, one-sided and myopic understanding of what it was that gave scientific management its importance. That while it is undoubtedly true that the techniques of the Taylorists have in many cases been utilised for the systematic exploitation of the working class there is nothing inherent within the nature of scientific management that preordains that it be utilised in this manner. Further, this paper argues that the development of Taylorism created tremendous possibilities for those who would replace capitalism with a society based on social planning rather than the vagaries of the market. Far from being merely a subtle, brutal tool only of use to the bourgeoisie the paper supports Lenin's claim that Taylorism contained some of the 'greatest scientific achievements' of capitalism and that these achievements could be utilised by socialists to advance the interests of the working class. It is concluded that it was recognition of these facts that explains Lenin's action just as it explains why so

many other leaders of the labour movement, both revolutionaries and reformists, abandoned their blanket hostility to Taylorism during the 1920s (Nyland, 1988). Finally, it is contended that there are urgent political reasons for modern day Western Marxists to follow this example and take up the more balanced and sophisticated understanding of Taylorism that emerged within the international labour movement in the years immediately after Lenin's death.

Scientific management

In the last quarter of the nineteenth century capitalism entered a period of decay as the impetus it had gained from the First Industrial Revolution weakened its intensity (Wells, 1889). This period saw the onset of a prolonged crisis that stimulated the development of monopolies, imperialism, mechanisation and strong labour and socialist movements within many nations. With the exception of the last, these developments were particularly significant within the United States. The expanded size of US corporations enabled them to exercise a significant degree of market control. This control was used to limit the competition experienced by these firms, which saw in collusion and the restriction of production a more effective means of maximising profits than the traditional method of productivity improvement (Veblen, 1921). The enhanced size of the firm, however, created problems for this strategy. Large-scale production required a dramatic expansion in the volume of overheads. Growth of these fixed costs meant it was necessary for the corporations to operate their enterprises at a high level of capacity if an adequate rate of profit was to be attained. The growth in the size of the firm also created difficulties with labour control, a problem which tended to be compounded by the growth of the labour movement which not only expanded in size and strength but also, as Hobsbawm (1964) has put it, came to understand the rules of the game. Over the long term the incapacity of traditional management methods to deal with these developments induced a decline in the rate of productivity growth, an increase in the organic composition of capital and a continuing decline in the rate of profit (Gillman, 1967).

These problems gave rise to the systematic management movement during the 1880s. The 'systemisers' were a diverse group of engineers, accountants and works managers who argued that US firms had grown to a size where the internal functioning of the enterprise was becoming increasingly chaotic and wasteful. Traditional forms of management, it was insisted, were not suitable for highly mechanised and concentrated forms of production. 'Method' and system, these technicians argued, had to

replace the improvisation associated with traditional management practices (Haber, 1961; Litterer, 1963). Of those technicians who took up the quest of systemising production the most influential was Frederick Taylor. As the 'Father of Scientific Management', Taylor pulled together the diverse influences attempting to induce greater use of scientific method within industry. When asked to define what he meant by scientific management, Taylor used to reply that it involved a 'mental revolution'. He meant by this that it could not be defined by method alone but that it also involved a new attitude of mind.

> It meant that the methods developed over a century of industrial life by rule of thumb and tradition could not, for that reason, be accepted without question. The whole situation in any undertaking, in any trade, must be re-examined, with the detachment from preconceptions, the intellectual technique, and the integrity of a worker in the exact sciences. (Urwick, 1930: 26)

Taylor believed that his systematic approach to the problems of management provided a means by which productivity, wages and profits could be boosted radically. The scale of these improvements, he believed, would be so large that all major sources of friction between employer and worker could be overcome. There were, he suggested, two primary obstacles preventing this goal being attained.

> The chief causes which produce this loss to both parties are: First, and by far the most important; the profound ignorance of employers and their foremen as to the time in which various kinds of work should be done (and this ignorance is shared largely by the workmen) . . . Second: Their indifference as to the proper system to adopt and the method of applying it, and as to the individual character, worth, and welfare, of their men. (Taylor, 1903: 1238-1349)

To overcome these obstacles, Taylor argued, employers needed to determine the most effective means of undertaking any task. Because managers did not have such knowledge they had no accurate way of knowing whether they were receiving a 'fair' return for the wages they paid. It was not possible to rely on the workers' goodwill to ensure they provided a fair day's work, Taylor insisted, because workers were both naturally indolent and subject to the pressure of social effort norms. Given employers invariably cut rates if workers increased their efforts significantly, Taylor believed that the actions of the workers were perfectly rational. He was convinced, however, that if profits and real wages were to be improved it was imperative that these practices

be eliminated. As intensity levels could not be left to the workers to determine, employers had to be given greater control over these norms. The key to attaining this greater control was accurate knowledge of all aspects of the production process.

To obtain the knowledge he believed they needed Taylor proposed the employers utilise the methods of science to measure what workers actually did and utilise the information obtained to develop the 'one best way' of working (Kelly, 1982: 8). Taylor's method for attaining this knowledge involved first the detailed study and recording of all aspects of the production process. Second, the systemisation of this data into a form which made it possible for the design of jobs to be undertaken by technicians away from the shop floor. Third, the accurate determination of optimum standards of performance for worker and machine. Fourth, the redesign of the flow of production to a form which maximised management's control over all its aspects. If managers used his methods, Taylor argued, they would be able to establish incentive systems that would induce the workers to raise the intensity of their labour-time but would not motivate the employers sufficiently to induce them to cut the rates.

In their contributions to the revived debate on the nature of Taylorism that began in the 1970s, left participants have tended to deal primarily with questions of labour control and ideology. Virtually all these interventions have accepted that scientific management was universally opposed to the interests of the working class. Braverman (1974), for example, argued that Taylorism was an instrument for the systematic de-skilling of the workers and a tool for strengthening the power of employers. Its widespread application through the twentieth century, he argued, has all but totally degraded the nature of work. This claim, however, has been challenged by numerous scholars. It has been pointed out that while the utilisation of scientific methods in the design of jobs did increase capital's ability to de-skill many tasks this was not a unilateral tendency. In many cases the skill content of jobs, both old and new, has tended to expand through the century (Palloix, 1976; Elger, 1979). Often this enrichment has been a direct consequence of the rationalisation process.

Kelly (1982) has gone even further and challenged the claim that scientific management was a *cause* of de-skilling. The fact that Taylor's methods were used by capitalists for this purpose, he has pointed out, does not mean de-skilling was necessarily an inherent element within Taylorism. Likewise, the fact that employers and indeed Taylor himself saw his techiques as tools which could be utilised to undermine the power of workers to determine shop floor standards and methods of work does not mean they necessarily had to be used for this purpose. How the

results of the systematic study of the production process were utilised was a question of struggle between capital and labour. There is no reason to presume that only employers stood to gain from this research. To assert otherwise constitutes a mirror image of Taylor's unjustified claim that his use of scientific method was always value-free and neutral in its implications for the different classes of society. In short, it confuses essence with execution. Paraphrasing Marx, it assumes that any utilisation of the techniques of scientific management other than the capitalist one is impossible (Marx, 1976: 569). This is all but equivalent to suggesting that because physics has repeatedly been utilised in a form opposed to the interests of the working class it is inherently exploitative.

Taylor and technical knowledge

Another misconception that is common in the modern literature is that scientific management was not particularly concerned with advancing technical knowledge. Braverman, for example, argued that Taylorism's contribution to the development of technology was minor. He has difficulty sustaining this position, however, for his honesty compels him to acknowledge Taylor alone made a number of significant technical contributions to machine shop practice. To maintain his position, in the face of this inconsistency, Braverman (1974: 85) is forced to claim that Taylor's innovations were merely 'by-products' of his efforts to expand the employer's control over labour. Fortunately, this blindness to the importance of Taylor's technical contribution has not afflicted all those who have contributed to the revived debate. Kelly (1982: 6), for example, has pointed out that the tendency for many scholars to concentrate only on the issue of labour control has obscured the important role Taylor's technical work played in the raising of labour and machine output. He notes that this narrow one-sided perspective has led many observers to see in Taylorism little more than time study and wage incentives. Such an assessment ignores the detailed nature of the Taylorists' research and the breadth of their approach to the problems of production. Taylor, for example, made significant contributions to the systemisation of the production process in the areas of stores accounting, stores management purchase, standardisation and plant design and layout. He also developed a number of important new products the most significant of which was high-speed steel.

Kelly has also pointed out that the *systematic* nature of scientific management has tended to be overlooked. Taylor came to place increasing emphasis on organisation as the key element determining the efficiency of production. This point has been

endorsed by Meiksins (1984) who has observed that Taylor's ideal programme involved much more than just the regulation of the workers' labour time. It involved the application of the scientific method to the realm of organisation, administration, distribution and indeed all areas of production in which a systematic approach to problem-solving was beneficial. The first step in his plan for organising a workshop was always the improvement and standardisation of tools, machinery and equipment, together with the systemisation of the workplace. This last step involved the introduction of more efficient storage systems, cost-accounting procedures and a system of routine maintenance and repair. Once these 'preliminary' steps had been undertaken, and he suggested this could be expected to take about a year, the scientific manager was then to turn to the task of reorganising the management of workplace activities. Central to this process was the establishment of a Planning Department which was responsible for organising and controlling the flow of production throughout the workplace. As Meiksins correctly observes;

> The Taylor system, then, while it did involve time study and incentive wages, was really a program for the overall reorganisation of the shop. In general terms, it placed control over virtually all shop activities in the hands of a centralised planning department directed by engineers. (Meiksins, 1984: 181)

In Taylor's early works the Planning Department had been known as the Rate-Fixing Department. It is crucial that the exact nature of this change of name be noted, for it signifies the dramatic maturation in Taylor's conception of what was required within the production process that was to give his work so much significance. The planning of production within the firm was, of course, not a totally new idea within industry. Managers had always, to some extent, planned and supervised the production process. Indeed, many of Taylor's planning and control mechanisms were taken from established shops. What made his contribution unique was that his commitment to experimentation, standardisation and systems for ensuring quality of output enabled him to raise the extent to which production could be effectively planned to a dramatically higher level. As Persons (1929: 81) has observed,

> [Taylor] integrated mechanisms into an interlocking whole, and the degree to which planning and precise control were developed by him was so great in quantity as to create a new qualitative situation. Planning generally had not been effective because it was based on so many chance factors.

> Now, with the aid of standardization, calculations could be made with a fair degree of certainty. This made possible the planning-room procedures of routing, scheduling and complete and economical utilization of facilities. It was this precise control through planning and preparation which secured most of the results of increased productivity by eliminating idle times and misapplied efforts, which are the result of many different causes under uncontrolled conditions.

The centrality of planning in Taylor's work was stressed by Alfred Marshall (1927) in his analysis of the nature of scientific management. Likewise, the claim that what made Taylorism so significant was its contribution to the development of resources was argued by Tugwell. This latter scholar was an institutionalist who was convinced that the domination of production and the state by 'business' condemned the human race to scarcity. In the work of Taylor he recognised the existence of tools that had the potential to overcome this situation. For this reason he argued that '. . . the greatest economic event of the nineteenth century occurred when Frederick W Taylor first held a stop watch on the movements of a group of shovellers in the plant of the Midvale Steel Company' (Tugwell, 1932: 86). What made Taylor's activities at Midvale so important, Tugwell realised, was not his use of scientific method to give capitalists greater control over their employees. Rather, it was the fact that in order to do so, Taylor developed planning techniques which could enable the anarchic conditions that existed within the production process to be brought under *human* control. What was done with this control was of course an extremely important question. Singular concentration on this issue, however, has led many scholars to miss the point that tremendous possibilities were created by the development of these techniques. In short, in his technical contribution to the systemisation of production Taylor provided the basic planning tools which, if developed, could enable human beings to gain much greater influence over market forces and thus enhance their capacity to direct and control their own history.

While generally lauding Taylor's use of scientific method in the management of resources, Tugwell made two important criticisms of his work. First, he advised that it was necessary not to push too far the analogy between scientific management and science. Management, he observed, was an 'industrial art rather than an 'industrial science'. Taylor had consistently stressed this point. His attempt to establish rigid management principles consequently had been misguided. What was central in scientific management was not any set of fixed principles but rather the

notion that '. . . intelligence in contrivance, accuracy in measurement and willingness in adaption can make for greater productivity' (Tugwell, 1927: 128). The development of science in the management of resources, Tugwell noted, had soon outgrown the principles that Taylor had initially attempted to establish. This development, however, did not detract from the value of his original contribution which showed the way the development of systematic planning could advance.

Tugwell's second criticism of Taylor was that he had largely confined his use of scientific management to the workplace when what was needed was its extension to the entire economy in the form of a national development plan. In an address to the American Economics Association in 1932 he observed that Taylor had provided the basic technical tools that could make the construction of such a plan possible. It was only in the Soviet Union, however, that the necessary conditions thus far existed for fully realising the potential in these tools. Though a liberal who was critical of Soviet socialism because of its lack of political democracy, Tugwell was convinced that in a technical sense the future was becoming visible within the USSR. His interest in the Soviets' attempts to apply Taylorism on a national scale, through the 1920s, was accentuated by the onset of the depression in 1929. As the crisis deepened this interest was shared by increasing numbers within the United States. Many saw in the practices of the Soviet planning institutions policies which could be adapted to save capitalism from its tendency to experience periodic crises. In his 1932 address Tugwell lambasted both those who adopted this position, without thinking through the difficulties involved in grafting planning on to a market economy, and those who failed to see how limited the planning mechanism would necessarily be in an economy dominated by the market. Most of these individuals, he noted, had no idea of how fundamental were the changes required to give the planning mechanism sufficient power to ensure permanent growth and stability.

> Most of those who say so easily that this is our way out do not, I am convinced, understand that fundamental changes of attitude, new disciplines, revised legal structure, unaccustomed limitations on activity, are all necessary if we are to plan. This amounts, in fact, to the abandonment, finally, of laissez faire. It amounts, practically, to the abolition of 'business'. (Tugwell, 1932: 76).

The fact that Tugwell criticised those who naively called for the introduction of economic planning, without thinking through the implications of their demand, did not mean he rejected the possibility of introducing some degree of planning within market

economies. Rather he insisted that a certain degree of planning was not only possible within these societies but that very important advances could be had if this was done. The gains thus obtained, however, would be of a limited nature compared to what could be attained under a comprehensively planned economy. He likened the benefits possible with limited planning to those accruing to an industry which systemised and mechanised certain elements in the production process. The benefits attained by this procedure while impressive, were limited compared to that which could be had when all the elements had been rationalised and, more importantly, when they had been linked together to make a total process. Similarly, important gains could be had by rationalising separate sectors of an economy but this process must eventually end in the return of economic crisis unless the final step of linking these various sectors into a single system is taken. What is required to bring about this linking is a national plan.

Tugwell was convinced, however, that the conditions that would be necessary to attain this final goal had not yet been established within the United States. He therefore supported the introduction of limited planning wherever this was possible on the pragmatic grounds that such steps could provide some improvement in living standards and economic security. He also advocated this policy because he believed that the introduction of limited planning would establish the conditions that would eventually make possible the attainment of a comprehensively planned economy. The primary obstacle to the attainment of this latter goal, he believed, was political rather than technical. It was the employers' control of the means of production and their vested interest in ensuring the continuance of a market economy and the dominance of the profit motive. In the drive for profit, however, he recognised a contradiction. National planning of production, he argued, was the deadliest and most subtle enemy of the profit motive. Nevertheless, employer bodies were being compelled by their need to maintain profitability to agree to its limited introduction. Tugwell realised that the employers were taking this step because they believed they stood to gain from the existence of limited forms of planning. He also realised that this assessment was correct. However, he insisted that the establishment of such organisations was crucial for creating the conditions that would make the introduction of a planned economy possible. In their daily activities such bodies would demonstrate what could be attained with order and rationality. Moreover, their existence would '. . . be a constant reminder that once business was sick to death and that it will be again' (Tugwell, 1932: 84). For while limited planning could achieve significant improvements the essential problems, caused by allowing the pursuit of profit to be

the primary motivating force within the economy, would remain unresolved. Eventually, as the limits of piecemeal planning were reached, the profit motive would again lead society into crisis. This crisis, however, would occur in a different environment. It would be one in which people had experienced the benefits to be had from planning, even of a partial nature. In such an environment the continued existence of a market system would be seriously undermined. For this reason, Tugwell was convinced, the acceptance of partial planning by the owners of the means of production had ensured their eventual demise, a fate which would be long and lingering but which would be inevitable. When this inevitability was realised the potential within Taylorism to provide human beings with greater capacity to guide their own history towards consciously foreseen ends would at last be able to be realised. Hence:

> The setting up of even an emasculated and inffective central co-ordinating body in Washington will form a focus about which recognition may gradually gather. It will be an action as significant as the first observations of Taylor; and it can lead eventually to the completion and crowning of that genuis' work. (Tugwell, 1932: 88)

The 'second industrial revolution'

During the period 1910-1917 the American labour movement bitterly opposed the anti-unionism of the Taylorists and the manner in which many employers utilised Taylorism. As a consequence a number of the more liberal scientific managers began reappraising their attitude towards the unions (Nadworny, 1955: 97-121). This reappraisal was made easier by the death of Taylor in 1915. It was also aided by the beginnings of a tentative re-examination, by some unions, of what scientific management had to offer. The benefits that systematic management of the production process could bring to the worker in the form of higher wages and improved working conditions appeared very tempting to many unionists. What the unions wanted in return for their co-operation in introducing the new techniques, however, was a say as to how and where they were to be utilised and how the benefits were to be distributed (McKelvey, 1952: 21).

The war acted as a tremendous stimulant to the expansion of Taylorism. It made it necessary for US industry to maximise production while at the same time it generated a labour shortage which strengthened the union movement. The dilemma caused by these combined factors motivated both the state and an increasing number of private employers to turn to the Taylorists. Most of the leaders of the movement became involved in the planning and development of war production and this enabled

them to gain a rare opportunity to test and display their techniques on a large scale. The need for maximum production also acted as a catalyst accelerating the growth of a more harmonious relationship between the trade unions and the scientific managers. The war compelled the leaders of these two groups to work together and the success of this experience convinced many of the leading Taylorists that an essential condition for the successful introduction of scientific management into the workplace was the co-operation of the trade unions. It also made the unions aware of the tactical advantages greater scientific knowledge could provide them. The central figure promoting this shift among the scientific managers was Morris Cooke, an engineer who had worked closely with Taylor and who, indeed, has been described as Taylor's 'favoured disciple' (Jacoby, 1983: 21). Cooke was highly critical of the pro-employer bias shown by the majority of engineers and actively attempted to promote a wider understanding, within the engineering profession, of the need for unions and of the need to adopt a more sympathetic attitude towards the human factor. During the war he worked for the Ordinance Department and was largely responsible for its issuing of General Order Number 13 which recommended that government contractors accept collective bargaining, minimum wages, various health and safety conditions and the 8-hour day. These activities were to gain him the approval of the AFL and bring him into intimate contact with its president, Samuel Gompers. It was in order to capitalise on the goodwill generated within the labour movement by such activities that the Taylor Society, in the immediate post-war period, began actively prompting a policy of conciliation with the unions and began paying much greater attention to the human factor. This development, in turn, was to lead the Taylor Society and the AFL to forge a continuing even if hesitant alliance through the 1920s. There were, it is acknowledged, severe limits to the extent of this co-operation. Both sides retained a good deal of suspicion of some of the policies advocated by the other. While the unions welcomed the Taylorists' promotion of fatigue research, for example, they remained extremely wary of time and motion studies, arguing that the engineers tended to adopt a mechanistic and cavalier attitude to this issue (Nyland, 1988). Nevertheless, while it is true that the labour movement remained critical of some aspects of scientific management it is equally true that it abandoned its former blanket hostility as it became clear that the utilisation of its scientific core need not be monopolised solely by the employers.

The conviction common amongst the Taylorists that the 'indifference of management' was the key obstacle to greater national efficiency would appear to have been justified, given

Table 1 Indexes of employment per unit of output

Year	*Manufacturing (1899 = 100)* Wage-earners	Man hours	*Agriculture (1900 = 100)* Gainfully occupied	*Railroads (1929 = 100)* Man-days	*Mining (1929 = 100)* Man-days
1919	84	74	84	124	135
1920	78	67	83	120	128
1921	74	61	82	130	130
1922	64	55	81	119	119
1923	65	56	79	114	116
1924	64	53	76	114	118
1925	59	50	74	108	112
1926	57	48	71	105	112
1927	55	47	70	106	108
1928	53	44	68	102	103
1929	51	42	67	100	100

Source: Soule, 1962: 122

that the planning techniques developed by the scientific managers which were to revolutionise the production process had been widely known and available for over two decades. It needed the massive stimulus of war and the associated shortage of labour-power and state intervention to impel large numbers of US capitalists to take the steps necessary to begin realising the wider potential offered by systematic planning. For a significant number of firms, however, the war did have this effect and the post-war competition generated by these enterprises together with fear of unionism, a shortage of skilled labour and state encouragement proved an adequate substitute impelling US capitalists to continue the rationalisation process. In the post-war years there was a dramatic increase in the number of firms utilising the techniques of the scientific managers. During the 1920s this expansion developed into an efficiency craze with firms across the nation achieving enormous success in raising productivity. In the 15 years 1899 to 1914, for example, productivity growth within manufacturing had expanded by less than one half a per cent per year. In the seven years 1919 to 1926, on the other hand, output per worker increased by almost 40 per cent. A rate of productivity growth of this magnitude, Douglas (1927: 20) reported, was '. . . probably unparalleled in the history of the world'. Nor was this expansion confined to manufacturing for comparable rates of productivity growth were experienced in mining, transportation and agriculture (Thomas, 1928; Durand, 1930).

The extent of the acceleration in the rate of productivity growth amazed observers during the 1920s. As this expansion continued unabated it began to be realised that something almost unprecedented was occurring. In 1926, Clague (1926) attempted to gauge and analyse the nature of this new phenomenon. His examinations led him to report that the United States was experiencing what was '. . . perhaps the most remarkable advance in productive efficiency in the history of the modern industrial system'. The nature and extent of this advance was such, he concluded, it had to be considered as nothing less than a second industrial revolution.

Through the 1920s numerous scholars joined Clague in his attempt to analyse the nature of this 'revolution'. In general the participants to the debate accepted that while the long-term growth in the size of the United States economy could be explained by the nation's vast natural resources, availability of capital, advanced political structure and large internal market, these factors could not explain the recent rapid increase in the rate of productivity growth. As the debate progressed it began to be realised that the unique causal factor underpinning this growth was the manner in which the society's resources were coming to

be managed at the level of the firm, the industry and the nation. The centrality of this factor was stressed in the report of the Committee on Recent Economic Changes prepared for the President in 1929. It was also emphasised by Jevons (1931: 1) who attempted to spell out the enormous significance of this 'revolution' and to highlight its central feature.

> The changes are coming about as the result not merely of the application of scientific knowledge to industry, which was, in fact, the last phase of the first industrial revolution, but of the use of the inductive method in the study of an industry, and individual concerns composing it, with a view to gaining facts and generalisations which may serve sooner or later as the basis of the replanning of the productive process and plant. The essence of the new industrial revolution is the search for exact knowledge, and the planning of processes: from the minutiae of manual operations (based on motion study) to the lay-out of the machinery of a gigantic plant – even of a whole industry throughout the country.

Within the firm the rationalisation process placed particular emphasis on the development of functional management and internal planning (Chandler & Redlich, 1966). In the manufacturing sector, for example, stress was placed on the improvement and integration of mechanical devices which could give management greater technical control over both the resources utilised and the processes by which the product was produced. Greater attention was also applied to the utilisation of modern principles of organisation, costing, routing, office procedure, statistics and other refinements of control. Taylorist principles, moreover, were successfully applied to such areas as demand forecasting, advertising and marketing. In the case of the last, rationalisation radically advanced the growth of chain and department stores which enabled retailers to gain significant advantages from standardisation, and large-scale buying. (For data on the spread and development of scientific management within the firm, during the 1920s, see Tugwell, 1927; Durand, 1930; Dent, 1935.)

One of the more significant results that also arose from the development of planning, the Committee on Recent Economic Changes (1929) reported, was an increase in the capacity of the firms to secure, from large-scale or diverse areas of activity, levels of efficiency that previously could be had only within the small enterprise working under the direct control of a competent employer owner. Within many industries the desire to reap the benefits of this enhanced capacity to expand led firms to amalgamate their operations. Through the 1920s there was a marked increase in economic concentration which had as its primary

purpose the attaining of the efficiencies of scale and diversification that the development of scientific management had made possible (Sheldon, 1928).

When applying the Taylorists' techniques to the management of the firm employers often modified Taylor's methods radically. Despite these modifications it is important to note; 'In spite of any reservations which might be made it has always to be remembered that the essentials of the efficiency movement, so far as it concerns technology alone, trace directly back to Taylor' (Tugwell, 1927: 127). Unfortunately, many scholars have failed to appreciate this link. Radicals such as Edwards (1979), for example, have argued that a 'closer analysis' of the practices of the scientific managers suggests that their influence, while not unimportant, has tended to be overstated. Examination of Edwards' analysis, however, shows that it is based on the very narrow, one-sided understanding of scientific management typical of contemporary left contributions to the rationalisation debate. It takes as given the claim that Taylorism was merely a system of labour control with rigid unvarying principles. It also fails to examine how the movement progressed after 1915. Because of these failings Edwards' assessment does not appreciate the extent of the dissemination and maturation of Taylorism that occurred during the 1920s. Edwards' narrow perspective also leads him to fail to appreciate the extent to which the application of Taylorism moved outside the individual firm. During the 1920s there was a dramatic expansion in the number of bodies established to promote the dissemination of information and co-operation across industries. These organisations sought to establish links between individual firms which would enable management to plan its activities more effectively. Their establishment and growth was aided by the activities of Herbert Hoover, the most highly placed exponent of scientific management during this period. This engineer believed that the state had a crucial role to play within the economy. For Hoover this did not mean the state should control or regulate industry. He was vehemently opposed to direct interventions of this nature. Rather, he argued that the state should adopt policies that limited monopolies and helped business by showing it how to rationalise itself.

Even before becoming Secretary of Commerce in 1922 Hoover's influence was an important factor inducing the spread of scientific management. In November 1920 he used his position as President of the Federated American Engineering Societies to commission a study which aimed to discover the major causes of industrial inefficiency within the United States. Responsibility for undertaking this research he delegated to a committee prim-

arily made up of members of the Taylor Society. Hoover was to claim the subsequent report, *Waste in Industry*, was a major step forward in the transition of scientific management from its pre-war devotion to the minutiae of shop and office routine to broad questions of policy-making (Metcalf, 1975: 64). The primary conclusion of this committee that elicited the greatest interest from all sections of society, and from capitalists the greatest hostility, was the claim that poor management was responsible for well over half the existing waste while inefficiency attributable to the workers was less than 25 per cent and that even this percentage was largely the result of workers' justifiable fears of how management would respond if productivity was to rise (Committee on Elimination of Waste, 1921: 8-10).

If the employers found Hoover's study offensive, the trade unions hailed it with delight. The Taylorists' conclusions that poor management was the major cause of industrial inefficiency was publicised widely by the unions and used by them as a weapon to counter arguments that employers could not afford to pay higher wages or grant reduced working times. Utilising this study, union leaders also attacked employers for their 'rule of thumb' methods. To an increasing extent they exhorted capitalists '. . . to analyze production costs, to practice managerial economy' and make 'intelligent efforts to eliminate waste and to establish more efficient methods' (Nadworthy, 1955: 121). Rubbing salt into the employers' wounds, they also declared they were eager to co-operate with management to remove the waste the latter's incompetence had caused.

Hoover continued to promote rationalised production methods after becoming Secretary of Commerce. He established a large number of bodies, both public and private, which collated and disseminated statistical and scientific information which both enhanced employers' awareness of the benefits of scientific management and aided its application in an increasing range of areas. On issues such as standardisation, product simplification and the regulation of production to offset the trade cycle, Hoover's department was to take Taylorism out of the workshop and begin applying it at the level of the nation (Metcalf, 1975: 61). Unfortunately, however, Hoover's work was only a beginning, a beginning, moreover, which was kept under a very tight rein. While undoubtedly a progressive compared to most of his peers, Hoover's commitment to capitalism restricted severely the extent to which he would advance the wider application of planning, particularly where this might involve an interventionist role for the state.

The rate of profit and economic crisis

The radical acceleration in the rate of productivity growth had a tremendous effect on the US economy during the 1920s. Most importantly the improved utilisation and cheapening of resources that the use of Taylorism made possible acted as a massive counter-weight to the rising organic composition of capital and the associated tendency for the rate of profit to fall that had characterised US capitalism for the previous forty years. In his empirical study of the changing nature of the rate of profit Gillman (1957: 58-61) found that in the 50 years prior to 1919 Marx's basic predictions in this area were fairly well sustained. After this period, however, the organic composition of capital tended to remain constant or even to fall while the rate of profit reversed its long-term downward trend and began to rise. With the easing of the 1920-1922 depression, profits within the United States began to grow. Over the next seven years the return on investments grew phenomenally. Profits of industrial corporations increased at an average rate of 9 per cent during the years 1923-1927. For the decade as a whole profits rose by 80 per cent overall while the profitability of financial institutions increased by 150 per cent (Schlesinger, 1957: 68).

Through the 1920s, then, scientific management proved to have an enormous capacity to offset the tendency for the rate of profit to fall. By enabling the more efficient utilisation of resources it could generate large increases in productivity without invoking Marx's 'general' source of crisis, i.e., the tendency for constant capital to rise relative to that utilised for the purchase of labour-power. In raising the rate of profit, however, scientific management also created the conditions which, at the end of the 1920s, were to generate economic crisis. For while Taylorism offered a powerful method for offsetting the fall in the rate of profit, as applied in the 1920s, it did not resolve the problem of how sufficient demand was to be generated to ensure the mass of goods produced could be sold and the profits reinvested effectively. The division of the benefits of the 1920s prosperity was heavily skewed in favour of employers. Overall profits increased at twice the rate that productivity did. As a consequence, the share of disposable income received by the top 1 per cent of the population increased from 13 per cent in 1923 to 19 per cent in 1929 (Holt, 1977: 277-280). The severe imbalance between the rate of productivity growth and the rate of profit created a corresponding imbalance between peoples' ability to produce and their ability to purchase. Instability generated by this development was compounded by the high rate of fixed capital investment high profits encouraged during the 1923-1929 period. In an increasing number of industries this high level of investment created excess capacity with the result that the owners of

capital found it difficult to find substantial areas where their profits could be re-invested effectively – consequently they began to speculate. In late 1929 this unstable situation generated depression on a massive scale.

The onset of the 1930s depression caught the majority of US employers, politicians and economists unprepared. As in every other boom, those committed ideologically to capitalism had soon convinced themselves that prosperity would last forever. Their immediate response to the crisis was to look for scapegoats, with state spending and trade unions being particularly popular. Most economists, for example, initially attempted to exonerate employers of any blame. They argued that the crash was the fault primarily of big government and refractory labour and that the only way out of the crisis was to allow greater freedom for the market and for stricter controls to be imposed on government spending and the organised working class. For a minority of observers, however, the facile nature of this assessment was obvious. Indeed, for some the crash was seen as a vindication of arguments they had been promoting for a number of years. As early as 1925 the AFL had warned that in the employers' failure to share more equitably the rewards of rising productivity lay the seeds for disaster. Economists such as Tugwell (1927) and Hobson (1930), likewise, had warned that excess profitability generated by the success of Taylorism had created a serious imbalance in the economy. These individuals argued that it was imperative that the state intervene to increase effective demand. They were later joined by Keynes (1932: 525) who denounced those who were calling for retrenchment and cuts in spending. 'This is not a crisis of poverty,' he insisted, 'but a crisis of abundance'. With increasing vehemence the critics argued that the only effective answer in the crisis that Taylorism had engendered was the development of even higher and more extensive levels of planning. Thus, at a special meeting of the Taylor Society, held in 1930, Person argued that the crisis had been caused by the failure of society's economic and political leaders to adequately expand the planning process at the level of the nation. What was required, he argued, was the extension of the principles developed within the firm by the Taylorists to the whole society. 'If these were applied to the organization and control of industrial society, conceived as an organic whole, many and perhaps most of the forces which now cause periodic dislocations and distress in industrial life would be eliminated' (cited in Soule, 1932: 149-150). The major obstacle preventing the development of national planning, Person argued, was the inconsistency that existed between the basic principles of business enterprise – *individual self-interest and intuition* – and the basic principle of modern production tech-

nology – *co-operative integration*. If this inconsistenty was to be overcome it was necessary for the interests of the individual to be suppressed where these conflicted with the interests of society.

The only force capable of developing the institutional structure that would be needed to control individual self-interest sufficiently, it was realised by the critics, was the Federal Government. Consequently, they called for the establishment of a strong interventionist state that would guide, stabilise and inject some degree of rationality into the national economy. The exact nature state intervention should take was a question of intense debate amongst these individuals. Some argued that recovery was impossible with anything less than total socialisation of the means of production. Economists such as Cole (1929), Hobson (1930) and Chase (1932) argued that while Taylorism had solved capitalism's production problems, far from saving the social system it had sounded its death knell because the Taylorists had not provided any acceptable means of ensuring the greatly enhanced capacity to supply commodities was matched by a corresponding demand. Others, however, insisted that institutionalised planning needed to be applied only to certain areas of the economy. As the crisis deepened through 1930-1932 the critics were joined by a growing number of politicians and corporate leaders. In the title of his 1932 book, *A New Deal*, which he concluded characteristically with the question 'Why should Russians have all the fun of remaking a world?', Stuart Chase gave this emerging movement a name and in 1936 Keynes provided the tools which settled the question of how far planning needed to go to enable capitalism to stabilise.

A new historical epoch?

Through the early 1920s the adoption of Taylorism spread internationally, becoming widely recognised, by the end of the decade, as a major new force revitalising the production process throughout the capitalist world (Nyland, 1988). In his work *Americanism and Fordism*, written during the depression, Antonio Gramsci discussed the effect the introduction of Taylorist production methods in Europe was having on society and on the social and political attitudes of the various classes. Like Lenin, Gramsci firmly supported the rationalisation of industry. He opposed the exploitation of the workers that the use of Taylorism often made possible, but at the same time he recognised that the working class had much to gain from the application of science to the problems of managing production. He noted that while workers strenuously opposed some of the specific forms Taylorism could take, if capitalists were given a free hand, they were not opposed to rationalisation as such (Gramsci, 1971: 277, 292-293). Rather, he suggested, at least within Europe, the major source of opposi-

tion to the new methods came not from the workers but rather from 'parasitic' elements left over from feudalism such as the small landlords and their attendants, civil service personnel, the church, the army and a reactionary intelligentsia '. . . stuffed with myths about its cultural heritage and unable to accept its own uselessness and impending supercession by more vital forces' (1971: 278). He believed that in time the full-scale development of Taylorism would destroy the last vestiges of feudalism and would raise capitalism to a new high point based on planning, high profits and high wages. The last of these, he suggested, was necessary so that workers could enjoy a mode of living that would enable them to sustain the high-intensity work demanded by rationalised industry.

One of the basic questions Gramsci attempted to resolve in his discussion was whether rationalised capitalism would constitute a new 'historical epoch' in which the social system would be radically changed by a process of gradual evolution or whether the forces and contradictions generated by the widespread adoption of Taylorism would produce a revolutionary 'explosion'. At no stage in his discussion does Gramsci explicitly answer this question but, as Hoare and Smith have noted, it is clear throughout that he believed that, in the face of the capitalist regeneration made possible by scientific management, those committed to the revolutionary overthrow of capitalism were everywhere in a phase of retrenchment and retreat. Consequently, the forthcoming changes would invariably take place within an evolutionary rather than a revolutionary scenario. For the communist, Gramsci, this was clearly a pessimistic position to adopt. However, it did not mean he believed rationalisation had permanently resolved the basic contradictions of capitalism. He argued that the competitive lead Taylorism had given American industry would in time be eliminated as the new production methods became generalised. As soon as this possibility was realised and the potential for regeneration exhausted, the contradictions inherent within capitalism would again manifest themselves in crisis, making it both necessary and possible for capital to begin taking back the advances made by the workers. In other words, like Tugwell, Gramsci argued that capitalism's capacity to gain sustenance from the use of planning was severely limited, that private ownership of the means of production created insurmountable barriers to the realisation of the possibilities inherent in the scientific management of society's resources. Once the productivity-inducing capacities of Taylorism, that capitalism could utilise, had been so exploited, the gains from further rationalisation ceased outweighing the forces tending to lower the rate of profit, capitalists would once again be forced to turn

on the workers. The Taylorist epoch was thus to be of a decidedly limited nature.

Gramsci's understanding of the capacity of the American production methods to raise productivity, profits and wages and the consequent effect this capitalist regeneration would have on the revolutionary movement has certainly been realised in the time since he wrote. The techniques and ideas associated with rationalisation proved a tremendous stimulant to the rate of economic growth and the rate of profit within the capitalist nations. The capacity to expand production by the use of these methods has been far greater than that attainable from the greater accumulation of physical capital and, indeed, from all other sources (Denison, 1980: 70).

Gramsci's belief that the rejuvenation of capitalism would have a debilitating effect on the revolutionary movement has also been proven justified. In societies characterised by high growth rates and rising standards of living, the call to revolution appeared increasingly ludicrous and fell to an ever greater extent on deaf ears. The improved living standards rationalisation made possible, in other words, undermined the communists' primary justification for demanding the abolition of capitalism, i.e. that the capitalist system necessarily involved the ever-greater immiseration of the working class. It also undermined the primary source of the revolutionary movement's recruitment base, the workers who were forced to suffer the poverty and degradation of capitalism in decay.

To conclude that Gramsci's assessment of the potential for rationalisation to rejuvenate capitalism and counter the revolutionary challenge has been validated, by historical events, leads one to ask what of his forecast that Taylorism would in time prove increasingly ineffective at sustaining the vitality of capitalism. To attempt to tackle this problem within the confines of this paper is not possible. Consequently, comment on Gramsci's prediction is limited to observing that, as Rostow (1983: 10-17) has shown, the post-war global boom was largely based on the falling price of raw materials and the global exploitation of the production techniques pioneered within the USA prior to the Second World War. Further, that as he notes, it was the European and Japanese delayed exploitation of these techniques that largely explains the higher growth rates in these countries in the period 1950-1973. As the potential of these techniques has been realised these countries have, one after another, followed the path again pioneered by the United States since the mid-1960s. In short, since 1966 there has been a sustained decline in the rate of productivity growth within the USA and a subsequent fall in the rate of profit (Nordhaus, 1974; Baily, 1981; Harrison, 1982; Sachs, 1983;

Baily, 1984). To what extent a decline in the effectiveness of Taylorism is a cause of this deterioration is a question that at this stage is unresolved. Given the nature of the sources of growth during the post-war boom, however, it is not unreasonable to suggest that the deteriorating situation may be explained by the relative weakening of these factors. This is an explanation many have found impossible to accept because of its tremendous ramifications. The response to the crisis in the USA has been typical.

> As the trusted formula of high-volume, standardized production has ceased to deliver prosperity, America has been ready to embrace any explanation but the most obvious: The same factor that previously brought prosperity – the way the nation organizes itself for production – now threatens decline. Everywhere America has looked, it has seen the symptoms of its economic impasse, but the nation has been unable to recognize the problem because its roots are deeply embedded in the organization of America's business enterprises, labor unions and government institutions. (Reich, 1983: 119)

Finally, what of Gramsci's claim that as capitalism moved once again into a stage of decay the bourgeoisie would be compelled to begin taking back the gains won by the workers during the period of expansion. Writing in the mid-1980s one can fear that this prediction is also proving to have a good deal of substance. As growth and profit rates have declined, the depth of cyclical crises has intensified and unemployment has risen, employers and the state, throughout the industrialised world, have moved to offset the fall in profit rates by unleashing what Rostow has termed a 'barbaric counter-revolution'. This offensive has involved the cutting of wages and welfare spending, the undermining of working conditions, the driving up of the rate of exploitation and, in general, the growing spread of immiseration amongst the working class. This strategy, particularly if it is combined with fiscal and monetary policies which place pressure on employers to innovate, restructure and exploit what potential still exists within the market system, does have the ability to raise the rate of productivity growth and the rate of profit at least temporarily. If this process is to be sustained, however, what is needed is some new element that can provide capitalism with an acceptable rate of productivity growth and rate of profit. The boost to productivity, moreover, must be in a form that does not necessarily drive up the organic composition of capital. If this is not forthcoming, capitalists will be forced to compete by increasing investments in high technology, low employment areas. Along this path, however, lies the spectre of Marx's ultimate source of

capitalist breakdown, the tendency for technical and nature imposed limits to productivity growth to drive up the organic composition of capital and consequently for the rate of profit to fall (Lebowitz, 1982).

To put forward the hypothesis that the capacity of Taylorism to sustain capitalism may be approaching exhaustion is not to suggest that this social system has necessarily reached any final stage of development. Apologists for capitalism have always been overly eager to rush forward, with every sustained boom, to announce that the inherent instability of this social system has at last been overcome. Marxists, likewise, have too often been overly eager to suggest that the development of capitalism has finally reached its limits. Great care needs to be taken, therefore, when attempting to engage in any form of futurology. For it might well be the case that new ways to exploit the potential inherent with scientific planning, that are compatible with capitalism, will yet be devised. Likewise, there might yet be unexploited possibilities in other areas. In many ways we appear to be in a situation similar to that described by Engels in 1886 when it became apparent that the stimulus provided by the First Industrial Revolution was subsiding and that capitalism had entered a period of sustained decay.

> The decennial cycle of stagnation, prosperity, over-production and crisis, ever recurrent from 1825 to 1867, seems indeed to have run its course; but only to land us in the slough of despond of a permanent and chronic depression. The sighed-for period of prosperity will not come; as often as we seem to perceive its heralding symptoms, so often do they again vanish into air. (Cited by Hansen, 1985: 37)

As with many of his contemporaries, Engels was aware that the depression was a unique moment in the development of capitalism. Likewise, it has become clear to many observers today that we are now in some form of hiatus. Where the present situation differs from Engels' last days is that by the 1890s there were sufficient signs for him to suspect the potential inherent within a regulated, managed capitalism. At the moment it is difficult to see possibilities of comparable significance within contemporary capitalism. While acknowledging that a revival may come, therefore, it should not be presumed that this will occur. Given an ever more serious decline is possible, it is imperative to develop a viable, democratic alternative and to begin preparing for the next step in the creation of a rationalised society; the abolition of 'business' and the creation of a planned economy.

Conclusion

Those who pioneered the development of Taylorism strove to develop systematic planning tools which would expand the capacity of management to control the utilisation of the firm's resources. The Taylorists recognised that this was a two-sided process involving both the management of things and the management of people. On one side they sought to establish costing systems which would make it possible to specify areas of waste, the cost of separate processes and the profitability of individual areas of production. By systematically analysing methods of production, rather than relying on tradition or rule of thumb, the Taylorists were able to develop tools which greatly aided the flow of resources both within the firm and across the various sectors of industry. Their methods, moreover, enabled the further development of large-scale production which necessarily requires systematic co-ordination and co-operation if it is to function effectively. Taylorism's second task involved providing employers with greater control over labour by concentrating knowledge in the hands of management and by developing methods of work and systems of reward and punishment which would enable the latter to regulate the mass of effort workers normally undertake.

That the Taylorists aimed to enhance management's control both over people and things has been recognised by many of the radical scholars who have contributed to the debate on the history of management science that has taken place since the early 1970s. Most of these individuals, however, have chosen to discuss only the first of these two elements. This narrow, one-sided perspective has seriously limited the value of most of their contributions and has proved a major obstacle to the development of the so-called 'labour process debate'. The extreme importance of the issue of labour control has not been denied in this work. What has been argued is that to separate out the labour control aspect of Taylorism and to attempt to analyse this factor independently of scientific management's other dimensions, as so many of these scholars have done, produces a radically one-sided, myopic perspective which conceals more than it reveals of the real nature of the rationalisation process. Because of the harm the promotion of this perspective has caused, it has been necessary in this work to place primary emphasis on bringing out the point that labour control was only one aspect of Taylorism and that scientific management does have a scientific productive essence which has been of great value to the working class. That employers have also advanced their interests by the use of management science should not be allowed to obscure this fact. By conceiving of Taylorism merely as a form of labour control, radical scholars have been led to deny the labour movement the credit it deserves

for aiding the maturation of management science. They have also been led to seriously underestimate the influence Taylorism had on the development of the forces of production and on the continued viability of capitalism. Where Gramsci, Tugwell and Jevons, writing at the depth of the 1930s depression, had the ability to recognise Taylorism's potential for revitalising this social system, most of those who have engaged in the labour process debate, despite the fact that they lived through this period of revitalisation, have not been able to develop the level of understanding achieved by these scholars. They have rather accepted as valid the limited conception of scientific management that employers initially attempted to adopt and have confined their contribution merely to criticising some of the ways in which employers and the capitalist state utilised Taylorism. In the process they have helped to disarm the working class by undermining its ability to consciously utilise management science and have effectively allied themselves with those conservative political forces committed to besmirching the positive role played by the planning mechanism through the twentieth century. They have also failed to highlight the extent to which the application of industrial, economic and social planning underpinned the post-war boom and have thus helped to prevent the labour movement being able to capitalise politically on these achievements, as Tugwell hoped would be possible, when the impetus given to capitalism by the utilisation of those aspects of planning compatible with private ownership of the means of production began to wane. Consequently, the Margaret Thatchers of the world have been able to successfully promote the claims that state intervention within the economy is the primary cause of our present malaise and that market freedom rather than systematic planning has most to offer the working class.

Failure to understand why scholars such as Lenin believed scientific management contained a number of the 'greatest scientific achievements' of capitalism has also led those who have engaged in the labour process debate to fail to comprehend the socialist potential inherent in the rationalisation movement. The possibility of building socialism within the USSR, Lenin recognised, required the Soviet government to combine its political power with the most advanced technical achievements of capitalism. These achievements included those capitalists' planning tools which could be suitably modified to suit the needs of a socialist society. The establishment of a national economy based on planning rather than on the tyranny of the market, the Bolsheviks soon realised, requires the use of the most highly sophisticated management techniques. It needs to be added this was not a matter of choice, for freedom of choice only lay in the

use to which these techniques were put and the extent to which they were modified to suit the needs of socialism. If human beings are to gain any significant degree of control over the market, it should surely be clear to all but the most utopian of individuals, that the 'economics of feasible socialism' make it imperative that humans be able to effectively plan the utilisation of society's resources. As Gorbachev (1986: 37-46) has consistently stressed, planning at this level cannot be undertaken effectively without the science of management. Historically, one of the most effective criticisms of the socialist objective was the observation that no matter how attractive might be the idea of a society based on planning, rather than the vagaries of the market, a national economy was too complex a phenomenon to plan effectively. The development of scientific management through the twentieth century, in both the socialist and capitalist nations, has forged a powerful tool which while still so very far from perfect has already developed sufficiently to greatly undermine the validity of this argument. In short, the development of management science has greatly enhanced the capacity of human beings to construct a society based on democratic and effective planning.

Throughout the early years of the rationalisation movement's development Taylorists constantly complained that the hostility and disinterest they received from most employers was one of the major obstacles hampering the advancement of their work. Conservatism and risk aversion rather than the enterpreneurial spirit, they discovered, was the norm within turn-of-the-century capitalism. In time, however, the very nature of the relations of production inherent within this social system ensured that the development of management science was able to break through these barriers with competition gradually forcing an increasing number of employers to take up those aspects of Taylorism which they found were necessary to enable them to continue to engage in the accumulation process. Governments likewise came to accept that if they were to fulfill their dual functions of legitimation and accumulation effectively, they had to accept the need for a degree of economic and social planning. Capitalist relations of production, in other words, acted as a positive influence compelling the acceptance and further development of this new element in the material forces of production. The property relations of capitalism, however, severely limit the extent to which this social system can realise the potential inherent within the planning mechanism. Thus, though capitalism gave birth to the rationalisation process and enabled it to develop within its framework its property relations limit the extent to which this material productive force can mature. From being a positive influence inducing the maturation of the rationalisation

process capitalist property relations can thus become a major fetter to its further development. When this occurs and the economic crisis that has bedevilled the capitalist nations for the last two decades suggests that this stage may possibly have been reached the time will have come when it will be necessary for these fetters to be removed.

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