LABOUR UTILIZATION AND LABOUR MANAGEMENT IN THE BRITISH COALMINING INDUSTRY, 1900 - 1940

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CHAPTER ONE: INTRODUCTION

This thesis examines the utilization and management of labour in the British coalmining industry in the period between 1900 and 1940. The period was one in which the British coal industry experienced a dramatic reversal of fortunes. Over the nineteenth century and up until the First World War, output and employment increased rapidly. Expansion had been assisted by the opening-up of large export markets in Europe and by 1913, the British coal industry shipped abroad a third of its output of 287 million tons.

Dominating the world trade in coal in the very early twentieth century, the British industry slipped from its position of international pre-eminence in the years after 1913. In the interwar period, it was beset by shrinking export markets, high levels of unemployment, and bitter industrial conflict. In spite of the experience of intensifying international competition, it failed to reconstruct. There was a failure to concentrate production on large-scale, more productive mines, while the British industry also lagged behind European and North American competitors in the application of new extractive technologies. It achieved a rate of productivity growth that compared most unfavourably with that of its international rivals.

In this study, the British coal industry's changing performance is examined in the context of its changing social and economic structure. The thesis is principally concerned with the changing pattern of industrial relations. But it is emphasized that the industry's uneven development cannot be understood in terms of labour relations alone. It is necessary to consider the structure of mine ownership and the competitive relations

between firms, and also the evolving relationship between landowners and mineowners. Landowners in Britain retained the ownership and control of coal royalties up until 1938, and the influence of landed property on the coal industry's development has been examined by Fine et al. (1985). Their work is summarized in chapter two, because it shows that the trajectory of capital-labour relations in British coalmining was in part the product of the increasingly antagonistic relationship between land and capital.

The thesis is not an institutional account of trade union and employer organization in the coal industry, and it makes no pretence to document at length the history of the industry-wide disputes, lockouts and strikes of the period under examination. Much of the detail on the latter has in fact been reported in the extensive literature on industrial relations in interwar British coalmining. Rather, the study places a central emphasis on work. It looks at working methods and practices which were remarkably varied in the period before 1913, and even more so in the interwar years when mechanization was introduced gradually and unevenly across the industry.

Throughout the period, the British coal industry was fragmented and diverse. The thesis relates inter- and intra-regional variations in the organization of work to the interplay of geological and market conditions, economic and social relations. It explores the linkages between work organization and labour organization. Miners were not automatically united by a common experience of work and indeed, unity was initially difficult to establish because there were complex divisions of interest. Uniform, industry-wide changes - as, for example, in working hours - impinged on local working practices in different ways, and local adjustments could affect particular groups and grades of underground workers differentially.

Nevertheless, the miners did achieve a growing unity from the early twentieth century around the demands for shorter working hours, better safety provision, and a national wage structure.

The coal industry was geographically fragmented and diverse, and the mineowners were also divided in terms of their economic interests. The policies of their national association - the Mining Association of Great Britain - continued to reflect this fragmentation. Production was organized under different geological conditions and oriented towards different product markets, while mineowners controlled different work processes. Since uniform restrictions on labour utilization and national wage agreements would affect profitability unevenly, the mineowners could not agree to make broad concessions to the miners. They insisted on retaining maximum individual discretion in the areas of wage and employment regulation, and the flexibility to respond to changing economic conditions by reducing wage rates. The thesis shows that this had an adverse effect on the industry's long-term development. It reinforced other conditions that were inhibiting the reorganization and re-equipment of production.

Conflict was endemic in the coal industry and reached its height in the General Strike of 1926. The defeat of the miners ensured the defeat of the forces acting to promote reorganization and renewal. State intervention to assist reconstruction was postponed. The mineowners secured wage cuts, district wage settlements, and an extension of working hours. Profitability was maintained in the short-term while the British coal industry staggered on without the changes required to restore its competitive position internationally.

The analytical framework employed in the thesis can be distinguished from alternative theoretical perspectives informing accounts of the difficulties

encountered by British industries in the interwar years, and of the coal industry's particular circumstances. It is clearly distanced from orthodox neoclassical economic theory, which draws its propositions from an abstract, ahistorical model of an atomistic market economy. It is closer to, but nevertheless distinct from, the 'institutional perspective' on British economic decline elaborated by Elbaum and Lazonick (1982, 1986) as a critique of orthodox economic theory.

Elbaum and Lazonick suggest that the relative decline of the British economy in the twentieth century has been a more or less continuous process that can be traced back to, and explained in terms of, 'structural rigidities' in its economic institutions that developed in the nineteenth century heyday of British laissez-faire capitalism. They argue that while these institutions had been conducive to economic expansion in the nineteenth century world economy 'characterized by competitive capitalism', they presented a formidable - 'if not insurmountable' - obstacle to economic development in the twentieth century world economy 'characterized by corporate capitalism' (1982:1).

Elbaum and Lazonick suggest that the transition from competitive to corporate modes of economic organization was achieved elsewhere - in the United States, Germany, and Japan - from the end of the nineteenth century, although they do not enter into the details as to how this transformation was effected abroad. Their model of 'successful' capitalist economic development is elaborated at a fairly abstract level. It is informed by two rather different perspectives on the nature of the firm and dynamics of change in the capitalist economy. It draws upon the work of the 'new' business historians and, in particular, Alfred Chandler's analysis of the structural transformation of business enterprise (1962, 1977), and also

upon labour process studies. Both sets of literature place a central emphasis upon management, and identify the firm as an agency of economic development. But in its treatment of the management function and the determinants of 'business strategy', the 'new' business history ignores the conflict between capital and labour, while labour process studies place an overwhelming (sometimes exclusive) emphasis on the capital-labour relation (for a more detailed review and critique, see Hyman, 1987).

Combining insights from these two sets of literatures, Elbaum and Lazonick argue that from the end of the nineteenth century the atomistic structures of 'competitive capitalism' gave way to 'corporate capitalism' as the dominant mode of capitalist economic organization in the world economy. They suggest that while British industries required transformation of their structures of industrial relations, industrial organization and enterprise management to compete with the corporate mass production methods being developed abroad, 'vested interests' in the old structures proved to be formidable obstacles to change (Elbaum and Lazonick, 1982:6).

The highly fragmented structures of industrial organization that had developed during the nineteenth century, when Britain dominated international markets, had nurtured highly competitive, specialized, and 'individualistic' managers. For the want of will and vision, such managers were powerless to alter their industrial environment from one dominated by small, traditional enterprises to one dominated by large oligopolistic corporations which internalized functions formerly performed by the market. Horizontal amalgamations did take place, but were unable to develop the centralized decision-making structures essential for the rationalization and re-equipment of production because the directors of participating firms insisted on retaining operational control of their family enterprises.

Structures of worplace industrial relations are identified as a further impediment to change and the establishment of mass-manufacturing systems. According to Elbaum and Lazonick, British workers with 'their powerful trade unions' successfully resisted management attempts to undermine the positions of craft control on the shopfloor that they had established during the 'long boom' of the late nineteenth century (1982: 7).

Britain's industries were unable to restructure autonomously, while leadership in the development of 'modern corporate structures' was not forthcoming from other sectors of the economy. By virtue of its early domination of international financial markets, British finance capital was able to eschew direct involvement in domestic industry, and 'the City' consequently failed to use its power to effect the 'concentration, integration, and technological transformation of British industry' (Lazonick, 1982:67). Elbaum and Lazonick argue that while governments in the 1930s and 1940s intervened to redress the problem of horizontally fragmented industry, the British state failed to provide the leadership required to transform existing institutions and lay the basis for the post-war development of a corporate mass production economy (1982:11).

As a critique of orthodox economic theory, Elbaum and Lazonick's 'institutional perspective' on British economic decline makes a valuable contribution. Neoclassical theory simply ignores the role of institutional structure in economic development and, indeed, offers little purchase on the dynamic processes of economic change, positing instead a 'timeless account of the conditions of "general equilibrium"' (Nolan and Marginson, 1988:3). But there are problems with Elbaum and Lazonick's analytical approach, and they could be criticized for establishing a model that is as static as the one that it is intended to displace. For they suggest that

British economic decline can be attributed to a set of sclerotic institutions, inherited from the past, and that have survived intact to the present day, acting as a brake on economic change. This seems unlikely, and the problem with Elbaum and Lazonick's 'institutional perspective' is that it treats institutions in isolation from the social forces impacting upon them. It is surely in the dynamic, complex and contradictory interplay of economic and social relations that institutions are fashioned, and at times displaced by new structures.

Thus, in this thesis, the British coalmining industry's changing performance is analysed in the context of its changing social and economic structure. Special attention is paid to the evolving pattern of industrial relations. It is recognized, however, that a more rounded and complete account would look at the interaction of relations between landowners, mineowners, and mineworkers, and set their interaction against the background of broader economic and political developments including the contours of government policy.

METHODS AND SOURCES

The thesis combines a variety of primary and secondary source materials to explore its major preoccupations and themes. Data have been gathered from the coal industry's well-stocked archives, and employed in conjunction with a re-working of secondary sources, in an attempt to establish and explain the utilization and management of labour in British coalmining in the period under examination.

The coal industry played a pivotal role in Britain's rise to economic supremacy in the nineteenth century, and exhibited to a special degree the

difficulties confronting British industrial capitalism in the years after 1913. It formed the site of the most acute struggles of the British labour movement, culminating in the General Strike in 1926, and the defeat of the miners was of the utmost significance in Britain's economic and political history. It is not surprising, therefore, that the industry has attracted so much attention from historians focusing on economic, social, and political developments. To review comprehensively the great volume of secondary literature on the industry in the period between 1900 and 1940 would be an impossible task, and consequently no attempt has been made to undertake such an exercise. Some indication, however, can be given of the ways in which the secondary source material has been employed in the thesis.

One of the ways in which economic historians have discussed the industry's changing performance is in terms of entrepreneurial failure or success. The principal theoretical perspectives informing the debate are located and discussed in chapter two, which examines critically a number of empirical studies of the interwar industry's difficulties. Economic historians, by and large, have been concerned with the technology, but not the social relations of production. Labour historians, on the other hand, until relatively recently had been preoccupied with the formal institutions of industrial relations, documenting the emergence and growth of district and national miners' trade unions often without delving too deeply into the organization of work below ground. This approach has been challenged by the 'new' labour historians, who have placed a central emphasis on the nature of work and very valuable studies of the influence of work relationships and working practices and conditions on the character of mining trade unionism have been completed by Daunton (1981), Harrison (ed., 1978), and

Goffee (1981). The thesis draws upon and augments such work. It also discusses the sociological studies of workplace relationships in British coalmining completed in the 1950s and 1960s by, for example, the Tavistock Institute (Trist and Bamforth, 1951; Trist et al., 1963), Goldthorpe (1959), Dennis, Henriques, and Slaughter (1956), and locates the different analytical perspectives informing these accounts.

The thesis has been informed by a wide reading of the secondary source material and has drawn upon a diverse range of primary and official primary sources. One of the most valuable sources of information has been the *Colliery Guardian* - the industry's trade journal, which was established by the Mining Association of Great Britain and commenced publication in 1858. Copies of this weekly publication are kept at the library at Hobart House - British Coal's London headquarters - and a lengthy period of research there allowed perusal of the issues from the late nineteenth century. While the editorial column of the Journal often acted as the mouthpiece for the mineowners' association, the *Colliery Guardian* reported on a wide range of issues - the state of the coal trade; parliamentary debates on the coal industry and legislation pertaining to it; industrial stoppages and disputes at national, district, and pit levels; company histories, profits and performance. It also published or reproduced articles by engineers, managers and owners on mining systems, technology, working practices, payment systems, and 'human relations' management. The *Iron and Coal Trades Review* (1866-1961), also formed a useful source, particularly on what contributors referred to as 'technical progress' in coalmining.

Other fertile sources of information on labour utilization and management include the *Transactions of the National Association of Colliery Managers* (dating from 1889), again kept at Hobart House and reproducing the papers

presented at meetings of the regional associations of mine managers, and the *Transactions of the Institute of Mining Engineers* (which also dates from 1889 and was continued as the *Mining Engineer* after 1960) and which again reproduced papers and discussions from the various regional Institutes of Mining Engineers. Archival research was also completed at the Leicestershire Record Office and at the National Library of Wales, Aberystwyth - where the records of the respective regional mineowners' associations are housed - and contributed detail on the diversity of working practices and systems in the industry.

The thesis has also relied heavily upon the evidence presented to and reports of the various Royal Commissions and numerous official enquiries into the coal industry's affairs in the period under examination. For evidence on working conditions and practices it has drawn, in particular, on the Reports, Minutes of Evidence and Appendices of the Departmental Committee appointed to Enquire into the Probable Economic Effects of a Limit of 8 Hours to the Working Day of Coal Miners (1907-8); Reports and Minutes of Evidence of the Royal Commission on Mines (1907-11); Report of the Royal Commission on the Housing of the Industrial Population of Scotland (1917-8); Reports of the Royal Commission on the Coal Industry (1919) (Sankey); Reports, Minutes of Evidence, and Appendices of the Royal Commission on the Coal Industry (1925) (Samuel); Report to the Secretary for Mines of the Committee Appointed by him to Inquire into the Qualifications and Recruitment of Officials of Mines (1929) (Holland); Reports and Minutes of Evidence of the Royal Commission on Safety in Coal Mines (1938-9); and the Report of the Technical Advisory Committee on Coal Mining appointed by the Ministry of Fuel and Power (1944-5) (Reid).

Parliamentary and British government publications employed principally as a source of statistical information (on employment, output, exports, productivity, accidents, wages, industry structure, and so on) include the General Reports and Statistics of Mines and Quarries, published as command papers between 1897 and 1920; Annual Reports of the Secretary for Mines (Mines Department, Board of Trade, 1922-38); Ministry of Fuel and Power, Statistical Digest from 1938 (1943-4); and the annual List of Mines in Great Britain (Mines Department). Using the last of these publications, a considerable amount of effort was devoted to adding up the number of mines, and colliery companies in operation in the industry in just one year. This work was made redundant with the publication of the fourth volume of British Coal's official *History of the British Coal Industry* (Supple, 1987), covering the period 1913-46 and including a similar exercise but for the three years 1913, 1924 and 1938 and therefore providing a more detailed overview of the industry's structure.

In addition to the sources cited above, information on the internal organization and policy statements of the Mining Association of Great Britain was gathered from the Association's Annual Reports (copies of which are held at Hobart House). It is worthwhile to note, however, that the Gainford Papers (kept at Nuffield College) are a more rewarding source of detail on the debates within the owners' associations.

OUTLINE OF THE THESIS

The thesis examines labour utilization and labour management in the British coal industry in the years between 1900 and 1940. It straddles two periods of contrasting fortunes in the industry's history; a period of vigorous

expansion and international pre-eminence in the years before 1913, and a period of relative decline in the 1920s and 1930s. In spite of intensifying international competition, the British industry failed to reconstruct. Production remained highly fragmented throughout the interwar years, while the British industry also fell behind its European and North American rivals in the application of new technologies of coal extraction. Clearly, any attempt to pursue a strict chronological account, periodizing stages in the development of the labour process, would be inappropriate. Rather, the thesis explores and attempts to explain the industry's unevenness and its technological backwardness in the interwar years.

Chapter two provides a broad overview of the industry's changing economic performance. Of course the coal industry was by no means the only great export-oriented sector of the nineteenth century British economy to experience a loss of overseas markets and acute economic difficulties in the years after the First World War. Economic historians have discussed the relative decline of Britain's staple industries in terms of the efficiency of management decision-making - the failure or success of the nation's entrepreneurs. Entrepreneurial performance has been assessed by different criteria. Neoclassical economic historians have conceptualized entrepreneurial success in terms of 'constrained optimization', or the minimization of costs subject to given technical and market constraints, while institutionalists have attributed British economic decline to the failure of the nation's industrialists to alter prevailing constraints on profitability. Three studies of the interwar British coal industry's difficulties which are informed by these different theoretical perspectives are examined critically in chapter two. The chapter concludes by

delineating the analytical framework informing the thesis. The broad outlines of this framework have been noted already.

Chapter three looks at work organization and also at wage regulation in the British coal industry in the period before the First World War. The industry's expansion hitherto had been based on the extension and intensification of working hours, rather than the transformation of production techniques. Coal production remained a labour intensive process and wages formed the largest element in the industry's working costs. Profitability was highly dependent upon the relationship between wages and selling prices. Over the second half of the nineteenth century, negotiations over wages had been conducted increasingly at a district (or county) level. Sliding scales were displaced by conciliation board agreements from the 1880s, but conflicts between mineowners and mineworkers continued to centre on the rate at which wages should fluctuate with selling prices.

The British coal industry of the nineteenth and early twentieth centuries was intensely regional, and in certain respects appeared more akin to a collection of different industries. Hand coal-getting remained the predominant method of coal extraction in all coalfields. At the coalface, the collier (or coalface work group) performed the complete operation of winning the coal and retained immediate control over the pace of work. Paid on a piece-rate system, colliers were subject to limited direct managerial supervision. The experiences of other grades of underground and surface labour were often quite different, while the degree of autonomy enjoyed by piecework coal-getters varied between coalfields and over time. Across the British coalfields, structures of work organization were remarkably diverse. Chapter three explores some dimensions of this regional diversity

and, in accounting for variegated patterns of work organization, considers the influence of geological conditions, relations between workers, and conflicts between mineowners and mineworkers.

Chapter three goes on to consider the influence of work and regional diversity in working practices on labour organization, and also on employer policies and practices at the level of organized collective action. It notes that while the miners were not united by a common experience of work, they did achieve a growing unity in their struggles for better wages, and conditions. Mineowners, on the other hand, remained fragmented and could not agree to make broad concessions. Any common employer policy had to accommodate regional diversity and therefore the owners could organize their collective strength only in opposition to the miners demands for national wage bargaining and industry-wide reductions in working hours. Thus, the mineowners were unable to intervene in their struggles with the miners in a way that would have promoted the progressive development of capitalist production.

Chapter four continues the exploration of regional (and intra-regional) variations in work organization, shifting the focus of analysis to contract work and internal subcontract systems. Three distinctive arrangements are identified: (i) the big butty system, whereby mineowners sub-let the working of an entire pit, or group of pits, to a contractor or partnership of contractors; (ii) the little butty system, where stallmen or contracting colliers undertook to work a section of coalface (or stall) at a piece-rate for which they were obliged to hire, or at least pay and supervise, a group of mineworkers; and (iii) arrangements in which the piecework coal-getter worked with a daywage assistant or apprentice.

The big butty system, which was only employed in certain coalfields in the nineteenth century, was on the decline from the 1860s. But the little butty system persisted in some districts and localities into the 1920s and 1930s, alongside hand-hewing at the face. Since the system could actually embrace a variety of different arrangements, and was employed in districts which were dissimilar in many other respects, care needs to be exercised in attempting to make any generalized statements on its operation and the reasons for its persistence.

The system could divide workers, although not necessarily into two clearly-defined camps, since relations between butty-men and management, and between butties and their co-workers or subordinates, were likely to vary even within the confines of a single mine. The abolition of the system, which in most districts had been made official union policy by the early twentieth century, could form the focus of intra-union conflicts, the resolution of which would be influenced by broader economic conditions and employer practices. And in analysing the reasons why unmechanized pits and ostensibly archaic forms of work organization could survive, it is necessary to consider the nature of competition in the interwar British coal industry.

Chapter five examines the system of 'machine mining' that was introduced in the interwar period. Only the process of undercutting the coal was mechanized. Other operations at the face and underground maintenance work continued to be performed manually, while the transformation of labour-intensive underground haulage techniques was limited to a very small proportion of mines. But the partially-mechanized mining system involved a radical reorganization of work. At the coalface, an extreme horizontal division of labour was imposed. The work was sub-divided into narrowly-

defined tasks, arranged in rigid sequence over three separate shifts in a twenty-four hour cycle of coal-getting operations. The introduction of machinery and reorganization of work effectively deskilled the colliers and eroded their immediate control over the pace of work, created the need for greater managerial resources to be devoted to the coordination of the production process and coercion of workers, and introduced new health and safety hazards.

Mechanization was a protracted and uneven process in the British coal industry. Geological conditions and structures of work organization combined in different ways to influence the suitability of different districts for mechanization, while conflicts between landowners and mineowners over the conditions for change developed unevenly and were resolved in different ways. Chapter five explores some particular examples. Because mechanization was an uneven process, the heterogeneity of work organization in the industry was heightened in the interwar period. The mineowners were unable to agree upon, or concede to proposals for the reorganization of the industry, and they were unable to agree upon a common employer policy other than one of resistance to national wage bargaining. The chapter draws out the implications for the industry's development of the defeat of the miners in the struggles of 1921 and 1926.

Chapter six looks at the recruitment and training of colliery officials and, in particular, at the changing role in the mines of deputies and overmen - the lowest ranks in the managerial hierarchy. Legislation passed from the final quarter of the nineteenth century and relating primarily to health and safety, made obligatory the appointment of certain grades of pit officials and specified a minimum level of training and qualification. Under the Coal Mines Act of 1911, deputies - drawn from the ranks of the

miners - were confined nominally to the performance of work relating to safety, although the legislation made provision for certain exemptions. The Act was framed in the era of hand coal-getting, but remained in force largely unamended throughout the interwar period.

The introduction of machinery and use of electricity below ground added to health and safety hazards. At the same time, the partially-mechanized mining system created new problems of labour management for employers, the need for greater coordination of the production process and more intensive supervision at the face, and this implied a rising overhead expenditure on supervisory staff. Chapter six considers the ways in which these pressures were met by firms - in some instances by breaching the sentiments of the 1911 Act, and elsewhere by subordinating deputies to the authority of overmen whose role was not prescribed in the various safety Acts. The chapter relates the hiatus in the progress of safety legislation in the interwar period to the industry's unevenness and the diversity in its production methods, and examines the implications for the health and safety of mineworkers.

CHAPTER TWO: THE BRITISH COALMINING INDUSTRY, 1900-1940

INTRODUCTION

The years between 1900 and 1940 straddle two periods of contrasting fortunes for the British coalmining industry. Over the nineteenth century and up until the First World War, the industry enjoyed a period of sustained expansion. Output increased more than ninefold between 1830 and 1913, from 30 million to 287 million tons. Employment rose from 110,000 to 1.1 million, and with the exception of the heterogeneous category of metal manufacture, machinery, vehicles, and metal products, coalminers formed the largest group of male industrial workers in early twentieth century Britain.

The industry's rapid and consistent expansion had been facilitated by the growth of manufacturing and commerce in Britain and, from the final quarter of the nineteenth century, by the opening-up of large export markets on the Continent. Representing 12 per cent of annual production in 1870, coal exports increased at a rate of at least 4 per cent per annum in the years to 1913 when Britain shipped abroad 97 million tons (34 per cent of aggregate output) of coal, coke, and patent fuel as direct exports and as foreign 'bunkers', or coal for shipping engaged in overseas trade. Over 70 per cent of British coal exports came from just two mining regions - South Wales and the North East - and over 70 per cent of the total was shipped to Europe. Coal constituted 10 per cent of the total value of Britain's export trade on the eve of the First World War, and 55 per cent of all coal entering world trade was mined in this country (Supple, 1987:7; Church et al., 1986: ch. 1).

The pre-war era of expansion and international pre-eminence, however, was eclipsed in the years after 1913. In the 1920s and 1930s, the British coalmining industry was characterized by collapsed export markets, high levels of unemployment and bitter industrial strife. The twentieth century brought a new and challenging set of economic conditions. International competition intensified as European economies improved their coal industries, concentrating output on large-scale, more productive mines. The rate of growth of demand in home and overseas markets stagnated in the interwar period, in the context of a world-wide economic crisis. Yet, in spite of these coercive pressures for change, the British industry failed to rationalize, restructure and re-equip itself internally.

The number of mines in operation in the British industry fell by about 30 per cent over the interwar years, from approximately 2,600 pits in 1913 to 1,900 in 1938 (Supple, 1987: 361, calculated from the *List of Mines*). An apparently drastic decline, therefore, still left the industry with an exceptionally large number of productive units and at the end of the period nearly 50 per cent of the industry's output was raised from its 1500 smallest mines, each employing less than 1,000 miners (see table 2.1). Within the British industry there were certainly marked regional variations in average mine size, pace and extent of concentration (see table 2.2). In the 'inland' coalfields of the East Midlands and South Yorkshire, for example, large-scale pits, sunk in the late nineteenth and early twentieth centuries, accounted for an increasing proportion of regional output over the 1920s, while the great bulk of Scotland's coal output continued to be raised from a plethora of small-scale mines. The British industry contained some large-scale modern mines, and production in a few districts was more concentrated by the end of the interwar period. But in comparison with

Table 2,1 Size Distribution of British Coalmines, By Output, 1924 and 1942

1924

Size of Mines (labour force)	Mines No.	%	Labour Force No.	%	Output Tons.	%
Under 50	818	33,0	13,508	1,1	2,394,533	0,9
50-499	848	34,2	199,300	16,5	43,454,587	16,4
500-999	422	17,0	305,532	25,2	66,356,643	24,9
1,000-1,499	198	8,0	242,264	20,2	51,729,260	19,4
1,500-1,999	77	3,1	134,198	11,1	30,043,541	11,2
2,000-2,499	61	2,5	134,588	11,1	29,486,767	11,0
2,500-2,999	31	1,2	84,380	7,0	19,734,479	7,4
3,000 and over	26	1,0	96,972	8,0	23,520,541	8,8
Total	2,481		1,210,742		266,720,351	

Average no. of miners per mine - 488
Average output per mine - 107,497 tons

1942

	Mines No.	%	Labour Force No.	%	Output Tons.	%
Under 50	691	39,8	11,036	1,6	2,532,035	1,2
50-499	513	29,5	122,815	17,3	33,832,577	16,6
500-999	300	17,3	212,551	29,9	59,411,650	29,2
1,000-1,499	127	7,3	152,058	21,4	46,413,431	22,8
1,500-1,999	68	3,9	113,754	16,0	32,592,621	16,0
2,000-2,499	24	1,4	52,805	7,4	15,683,946	7,7
2,500-2,999	10	0,6	27,324	3,9	8,121,556	4,0
3,000 and over	5	0,3	17,375	2,5	5,045,622	2,5
Total	1,738		709,718		203,633,438	

Average no. of miners per mine - 408
Average output per mine - 117,146 tons

Sources: Royal Commission on the Coal Industry (Samuel), 1926, Report, Vol.III, Appendix 18, p.177, Ministry of Fuel & Power, Statistical Digest from 1938 (Cmd. 6538),11.

Table 2.2 Size Distribution of Coalmines, By Output, Selected Districts, 1924

Size of Mines (Labour Force)	Mines No.	%	Labour Force No.	%	Output Tons.	%	Mines No.	%	Labour Force No.	%	Output Tons.	%
	Scotland						South Wales & Monmouthshire					
Under 50	102	23	1,915	1	395,760	2	204	34	3,521	1	565,556	1
50-499	235	53	56,619	40	14,576,189	40	225	38	46,308	19	9,554,545	19
500-999	84	19	58,411	41	14,565,221	40	89	15	63,455	26	13,246,312	26
1,000-1,499	15	3	17,468	12	4,595,937	13	39	7	46,986	19	9,498,241	19
1,500-1,999	4	1	7,772	6	2,027,270	6	14	2	23,928	10	4,954,310	10
2,000-2,499	-	-	-	-	-	-	20	3	44,230	18	8,849,759	17
2,500 and over	-	-	-	-	-	-	7	1	20,017	8	4,289,711	8
Total	440		142,185		36,160,377		598		248,445		50,958,434	
Average no. of miners per mine - 323 Average output per mine - 82,183 tons							Average no. of miners per mine - 416 Average output per mine - 85,215 tons					
	Northumberland						Durham					
Under 50	39	33	608	1	109,303	1	87	31	1,496	1	254,625	1
50-499	33	28	7,226	11	1,376,848	10	73	26	18,423	11	3,768,480	10
500-999	20	17	15,339	24	2,939,920	22	59	21	46,008	26	9,601,645	26
1,000-1,499	17	14	21,525	33	4,700,326	34	28	10	33,945	19	6,943,223	19
1,500-1,999	5	4	8,338	13	1,804,619	13	11	4	19,102	11	4,187,174	11
2,000-2,499	4	3	12,275	19	2,728,959	20	8	3	17,044	10	3,726,975	10
2,500-2,999	-	-	-	-	-	-	8	3	21,935	13	4,552,759	12
3,000 and over	-	-	-	-	-	-	5	2	17,312	10	3,638,688	10
Total	118		65,311		13,659,875		279		175,265		36,673,569	
Average no. of miners per mine - 554 Average output per mine - 115,762 tons.							Average no. of miners per mine - 628 Average output per mine - 131,446 tons					
	South Yorkshire						Nottinghamshire & Derbyshire					
Under 50	32	31	426	0,3	81,384	0,3	45	29	780	0,6	153,326	0,5
50-499	11	11	2,557	2	583,448	2	26	17	6,998	6	1,471,461	5
500-999	13	13	9,441	8	2,286,273	7	35	23	26,943	22	6,347,389	20
1,000-1,499	9	8	11,554	10	2,636,616	9	20	13	24,750	20	5,898,709	19
1,500-1,999	7	7	12,111	10	2,855,815	9	14	9	25,656	21	6,745,141	22
2,000-2,499	14	14	30,539	25	7,569,779	25	5	3	11,136	9	2,981,781	10
2,500-2,999	8	8	21,596	18	5,283,398	17	5	3	13,962	11	4,129,178	13
3,000 and over	9	9	33,975	28	9,517,584	31	4	3	13,935	11	3,404,630	11
Total	103		122,199		30,844,297		154		124,160		31,131,615	
Average no. of miners per mine - 1,186 Average output per mine - 299,459 tons							Average no. of miners per mine - 806 Average output per mine - 202,153					

Source: Royal Commission on the Coal Industry (Samuel), 1926, Report, Vol.III, Appendix 18, pp 177-9

developments on the Continent, the pace and extent of change in the British industry as a whole was slow and limited in the extreme. On the eve of the Second World War, the average annual output of mines in the German Ruhr was 780,000 tons, and in the Polish coal industry it was 750,000 tons. The average annual output of British mines, in contrast, was a mere 122,000 tons (statistics cited in Reid Report, 1945).

The British industry also lagged behind in the application of new extractive technologies. Again there were regional variations within the British industry in the pace of mechanization. But in 1935, only 55 per cent of British output was undercut mechanically, whereas mechanized coal-getting accounted for 97 per cent of output in the German coal industry, 98 per cent in Belgium, 88 per cent in France, and 79 per cent in the United States (ILO, 1938: 196). Moreover, by the end of the interwar period it was recognized that the British industry had fallen behind Continental and North American competitors not only in the application of machinery at the coalface, but also in the improvement of underground haulage and winding techniques (Reid Report, 1945).

The British coal industry achieved only a modest rate of growth of labour productivity over the interwar years. Output per manshift in Britain increased by only 13 per cent between 1913 and 1938. This compared with increases of 64, 40, 59, and 36 per cent in the German Ruhr, Belgium, Poland, and the United States, respectively (Supple, 1987:387). British coal became increasingly uncompetitive in international markets, and at the end of the interwar period the British industry shipped abroad only 20 per cent of a reduced output of 227 million tons. Unemployment in coalmining

rarely fell below 20 per cent during the late 1920s and early 1930s, and by the end of the interwar period employment had declined to 781,000.

Of course the coal industry was by no means the only great export-oriented sector of the nineteenth century British economy to experience a loss of overseas markets and acute economic difficulties in the interwar period of the twentieth century. The relative decline of Britain's staple industries has fuelled an ongoing debate on the efficiency of the nation's entrepreneurs. Schooled in different theoretical traditions, economic historians have assessed entrepreneurship by different criteria and have reached different judgements on the performance of Britain's industrialists. The principal positions in this debate are outlined in the next section of this chapter. The subsequent section examines critically a number of concrete studies of the interwar British coal industry that broadly parallel these divergent theoretical perspectives. The final section outlines an alternative analytical approach; one in which the uneven development of the coalmining industry and, specifically, its relative decline in the interwar period, are examined in the context of the industry's changing economic and social structure.

THEORETICAL PERSPECTIVES ON DECLINE

One of the ways in which economists and economic historians have discussed Britain's industrial performance since the late nineteenth century is in terms of entrepreneurial failure or success. Armed with different theoretical perspectives on the nature of the firm, and of the capitalist economy, scholars have assessed entrepreneurship by different yardsticks and have reached different verdicts on the performance of Britain's

industries and its industrialists. In recent years the debate has polarized into two opposing interpretations.

The 'new' economic historians, whose work has been publicized by Donald McCloskey and Lars Sandberg (1981), have combined neoclassical economic theory and quantitative methods to reinterpret British economic history. They have assessed the performance of Britain's industries by judging the economic rationality of decision-making at the level of the individual firm, and have conceptualized entrepreneurial success in terms of 'constrained optimization' - the minimization of costs subject to given technical and market constraints. The organizing framework is competitive general equilibrium theory which is a theory about the operation of an atomistic market economy.

McCloskey et al. argue that their quantitative work shows that market forces worked well throughout the nineteenth and into the twentieth century. That is to say, it is their view that 'rational' cost-price calculations underlay the decision-making of Britain's industrialists and that Britain's entrepreneurs maximized profits and economic efficiency by adopting production techniques most appropriate to the market environments in which they found themselves. According to the 'new' economic historians, therefore, if Britain's industries failed to match the achievements of US and European rivals this must have been due to exogeneous factors beyond the control of the nation's entrepreneurs.

The methodology and conclusions of the 'new' economic historians have been criticized by 'institutionalist' economists influenced by the work of Alfred Chandler and the 'new' business historians, and also by neo-marxist analyses of the capitalist labour process. Indeed, Bernard Elbaum and William Lazonick (1982, 1986) have developed their 'institutional

perspective' on the relative decline of the British economy explicitly as a critique of orthodox economic theory and its application to the study of British economic history by McCloskey and Sandberg. Elbaum and Lazonick argue that from the late nineteenth century onwards, the performance of the British economy lagged behind that of other industrialized economies, and in this experience they identify a clear case of entrepreneurial failure. In their view, the 'captains' of British industry performed admirably as neoclassical managers, taking the constraints that faced them as given and attempting to do the best that they could subject to these constraints. But as entrepreneurs they failed because they were unable to create new profitable opportunities by transforming their socio-economic environment in response to structural changes in the international economy.

More specifically, Elbaum and Lazonick argue that Britain's industrialists failed to reform the atomistic structures of industrial organization and structures of workplace labour relations that they had inherited from the nineteenth century heyday of British competitive capitalism. They failed to supersede the market mechanism by adopting the 'corporate forms of managerial coordination' developed abroad, and as a result were unable to develop the 'corporate mass production methods' of twentieth century international competition (1986:2). According to Elbaum and Lazonick, moreover, Britain's industrialists were unsuccessful entrepreneurs 'precisely because as individualistic managers in highly competitive and highly specialized structures they were powerless to alter the organizational constraints that determined feasible technological choices and profitable opportunities' (1982:12).

These divergent perspectives are broadly paralleled by studies focusing specifically on the interwar British coalmining industry. Sharing the

theoretical framework and sentiments of the 'new' economic historians, if not their exact methodology, Neil Buxton (1970, 1978) has mounted a vigorous defence of entrepreneurship in British coalmining. He argues that the problems that beset the industry in the 1920s and 1930s - falling overseas sales, excess capacity, turbulent labour relations - owed 'little to entrepreneurial failings' (1970:477). According to Buxton, Britain's mineowners reached decisions regarding mine size and choice of extractive technology that were 'rational and justified', and exploited all available commercial economies of scale through the unified financial control of small-scale mines. He contends that the origins of the industry's difficulties were located externally to it - in adverse demand conditions brought about by recession in end-user sectors.

Michael Kirby, in contrast, emphasizes the inability of mineowners to reorganize their industry by means of colliery amalgamation, or the 'fusing together to provide unified units of management of individual colliery undertakings' (1972:655). For Kirby, the amalgamation of colliery companies represented a means to achieve through 'cooperative activity' the structural adjustment that market forces had failed to secure - that is, the concentration of output on large-scale, mechanized mines, and elimination of marginal capacity. Elbaum and Lazonick cite Kirby's work as empirical support for their 'institutional perspective' on the decline of the British economy. But while they argue that the 'visible hand of coordinated control' had to be extended to Britain's staple industries by the state in the 1930s, Kirby suggests that state intervention in the coal industry formed part of the problem and impeded the process of rationalization and restructuring.

A third, and more idiosyncratic interpretation of entrepreneurial performance in the interwar British coal industry has recently been contributed by Michael Dintenfass (1988). He argues that mineowners successfully transformed the fragmented structure of capital ownership in their industry over the 1920s and 1930s, but failed to exploit fully cost-reducing and price-enhancing innovations in the technology of coal extraction, organizational practice and marketing. Dintenfass suggests that it was the 'inefficiency of corporate producers, not their absence, that accounts for the performance of the interwar British coal industry' (1988:3).

These contrasting accounts of entrepreneurial performance in the interwar British coal industry are considered in greater detail in the following section of this chapter. An alternative analytical approach will then be outlined; one in which the industry's deteriorating performance is discussed in the context of the changing relations between landowners and mineowners, the competitive relations between colliery firms, the evolving pattern of industrial relations, and the nature of the state's interventions over which the three classes of land, capital and labour struggled.

DEBATES ON ENTREPRENEURIAL PERFORMANCE IN THE INTERWAR COAL INDUSTRY

Entrepreneurial Success: A Failure of Demand

Neil Buxton has applied the laissez-faire theory of the entrepreneur to conclude that Britain's mineowners in the interwar period made rational and efficient business decisions. His favourable assessment owes much to his

redefinition of available production possibilities and sources of productivity growth in interwar coalmining. In the interwar period, many commentators believed that there were economies of scale in coal extraction. Consequently, they viewed the existing, fragmented structure of production as a principal weakness of the British industry, and urged that there should be extensive amalgamations of mines to improve the industry's productivity performance and strengthen its position in international markets (see, for example, Lubin and Everett, 1927; PEP, 1936).

The case was expressed most forcefully by the reports of successive Royal Commissions and official enquiries into the industry's difficulties. These analyses and, in particular, that of the Samuel Commission of 1925-6, informed interwar debates and have been influential in subsequent accounts of the industry's difficulties. The Samuel Commission urged that the reorganization of production should be achieved through the restructuring of mine ownership - or through the amalgamation of colliery companies - and that reform should be a voluntary process, with the 'initiative for change' at least in the first instance left to 'the industry itself' (Report, 1926). Mineowners, for their part, rejected the amalgamation of mines. In their evidence to the Samuel Commission they argued that there were no significant scale economies as yet unrealized. Throughout the 1920s they insisted that the fortunes of the British coal industry could be restored only through the reduction of miners' wages, an extension of working hours, and the substitution of district-level for national wage settlements - or a return to the structures of wage regulation in operation before government control of the industry during the First World War. Pressing for these revisions from the time that the industry was returned to private control

in March 1921, the owners precipitated a three month lockout in that year and a seven month lockout of miners and nine-day general strike in 1926.

Buxton's analysis of the interwar industry in many respects reads as an attempt to vindicate the policies and practices of the mineowners. He contends that the evidence presented in the interwar years on the existence of scale economies in the production of coal was unconvincing, and that the case for the amalgamation of mines was based more on conviction than rigorous analysis of the facts. He suggests that his own statistical analysis provides a more objective review of the matter. This comprises two sorts of correlation, based on various types of statistical data. The first assesses the relationship between mine size and productivity, using mining districts (as opposed to individual mines) as the unit for comparative analysis. This shows no significant relationship between increasing mine size and productivity, and Buxton uses the result to conclude that economies of scale were not of major significance in interwar British coalmining, and therefore that mineowners were rational to resist the amalgamation of pits.

The second exercise tests the relationship between mechanization and productivity, using the percentage of output undercut mechanically as a proxy for the level of face-mechanization in the sample districts. A positive relationship is attained and on the basis of this result Buxton concludes that it was mechanization, rather than mine size, that was the 'key to efficient production' and reason why small pits could be as productive as larger ones (1970:482). He goes on to explain inter-district variations in the level of mechanization in terms of divergent geological conditions. Thus, while he acknowledges that the British industry fell behind international competitors in the application of new extractive

technologies, he suggests that this was primarily due to the low level of mechanization in two districts - South Wales and Durham - contributing a high proportion of aggregate British coal output. And here, he contends, the ease of non-mechanized coal extraction and difficulties of mechanization respectively could justify the retention of hand coal-getting on the basis of relative factor prices and productivities.

While Buxton argues that the concentration of production on a smaller number of larger mines would not have benefitted the interwar British coal industry, he suggests that economies could be derived through the 'commerical integration' of colliery companies. He contends that such 'commercial' economies of scale - or economies derived through bulk buying, transport, and distribution - could be realized by small mines under 'unified financial control', and he suggests that such economies were fully-exploited by mineowners in the interwar years (1970:488). As evidence he cites the example of Scotland where 'there were over 400 pits in operation in 1930' but where 'no less than three-quarters of the total output of the district came from a mere 20 colliery companies', and proposes that a similar degree of 'unified financial control' in other districts shows that owners had organized themselves into commercial units of the appropriate size to attain the benefits of bulk marketing and distribution (Ibid).

In short, Buxton suggests that there is little evidence of entrepreneurial inefficiency in the British coal industry and that the difficulties of the interwar years are largely to be explained as the 'deleterious effects of demand-side forces' (1970:477). He absolves the mineowners from any responsibility for industrial unrest in the interwar industry, arguing that they were caught between the pressures of falling

demand and selling prices on the one hand, and 'relatively high wage rates' on the other (1970:495). In what remained a labour-intensive industry, wages necessarily formed the largest single element in working costs. After the lockout of 1921, wages were settled on a district basis but under a uniform national formula with minimum wage provisions. The latter, according to Buxton, imposed an 'intolerable burden' on profitability for all but those districts favourably endowed with the types of coal for which demand remained buoyant (1970:494). He suggests that minimum wage provisions continued to depress profitability after the 1926 stoppage, when the national formula was abandoned and owners revised minimum wage agreements on a district basis.

There are a number of problems with Buxton's analysis, however, and not least with the procedure he employs to dismiss the importance of economies of scale in production (on this, see Fine, 1978; and Evans and Fine, 1980, 1980a). Firstly, Buxton takes the structure of production as it was in the interwar period as representative of its potential. Unable to observe a relationship between mine size and productivity, he assumes that no such relationship could exist. But as Fine (1978) has pointed out, this line of reasoning is seriously flawed. Indeed, Buxton's statistical observations are quite consistent with the existence of a positive relationship between mine size and productivity. For if competition eliminated small pits, the condition for the survival of small-scale mines would be the possession of some advantage other than size - for example, favourable geological conditions. To compare small mines operating under favourable natural conditions with larger mines operating under less favourable conditions, really does not say very much about the way small-scale pits might have performed if reorganized into larger units of production.

Secondly, Buxton makes the error of testing the relationship between mine size and productivity, and between mechanization and productivity, separately. For if size and mechanization jointly determined productivity, and large mines were less mechanized than smaller ones, then the relationship between size and productivity would be obscured automatically. Ironically, as Fine has observed (1978:11), Buxton draws attention to this point by arguing that small-scale Scottish mines operating under unfavourable geological conditions survived because of their early and high level of mechanization (1970:484). In an admittedly fairly crude statistical exercise, Evans and Fine (1980a) run a multiple regression of productivity against mine size and mechanization taken together. They find that both are significant in explaining the levels of productivity attained in different mining districts; in other words, that economies of scale did indeed exist in the interwar British coal industry. This conclusion is confirmed in their more sophisticated econometric analysis of the industry's production function.

Thirdly, Buxton's statistical analysis is based on the assumption that factor inputs were fully-employed in production. Clearly such an assumption is untenable for the interwar coal industry which, as Buxton admits, was beset by surplus productive capacity. The great weight of evidence indicates that in many mining districts, many mines were operating below capacity in the late 1920s and in the 1930s. Hence they would have been unable to fully-realize scale economies because plant and machinery were underutilized. In their analysis, Evans and Fine find that excess capacity was an important factor in reducing productivity levels, and disguising the significance of returns to scale in most mining districts.

Buxton's explanation for the survival of small-scale Scottish pits also undermines his argument that 'the level of mechanization in the majority of coalfields in this country compared not unfavourably with that achieved abroad' (1970:491). Within the British industry, the Scottish coalfields did indeed attain an early lead in the application of coal-cutting machinery. In 1927, for example, 55 per cent of Scottish output was undercut mechanically, compared with 42 per cent in Northumberland, 22 per cent in Nottinghamshire and Derbyshire, 11 per cent in South Yorkshire, and 23 per cent for the British industry as a whole (Supple, 1987:380-1). In other words, hand coal-getting remained the predominant method of coal extraction in all but the Scottish coalfields. The position was rather different on the Continent. In the Ruhr, which accounted for the great bulk of Germany's coal output, 66 per cent of production was won mechanically in 1926. By the end of the 1920s, the proportion had risen to over 90 per cent and in the Belgian industry had reached 89 per cent (PEP, 1936: 154).

By the late 1930s, the Scottish lead within the British industry in the application of coal-cutting machinery had been eroded. Eighty-eight per cent of output in Northumberland, and 91 per cent in North Staffordshire, was undercut mechanically in 1936, compared with 79 per cent in Scotland. Nevertheless, nearly half (45 per cent) of aggregate British coal output was hand-got in 1936, whereas hand-hewing had virtually disappeared on the Continent. In Germany and in Belgium, the proportion of output won with machinery was 97 and 99 per cent respectively. Certainly the low levels of mechanization in South Wales and Durham dragged down the British industry's performance in the application of new extractive technologies, in comparison with Continental rivals. In these two districts, only 21 and 39 per cent of output respectively was undercut mechanically in 1936. But less

than 50 per cent of Yorkshire's output was cut mechanically, and by this time Yorkshire accounted for a larger share of aggregate British output than the South Wales coalfield. Buxton calculates that with the omission of the South Wales and Durham coalfields, the proportion of output won mechanically in the remaining (or truncated) British industry would rise to 75 per cent in 1938 (1970:490). Whether or not he is justified in excluding two of the British industry's principal exporting districts is a separate issue. Even with their omission, however, the 'British industry' hardly compared favourably with major Continental producers; the proportion of output won mechanically in 1938 being some 23 per cent less than that attained in the German industry two years earlier, and 25 per cent below that reached in Belgium by 1936.

Finally, Buxton's discussion of technical innovation in the coal industry deals only with the introduction of mechanical coal-cutters and face-conveyors, or what he terms 'minor innovations' (1970: 492). By the end of the interwar period, as demand conditions improved, commentators were increasingly inclined to attribute the problems of falling output and relatively low productivity to the British industry's antiquated capital stock, and to the fact that only minor innovations had been made in Britain's mines.

For example, the Reid Committee, appointed by the government in 1944 to investigate the technical condition of the British coal industry, compared the industry's organization and technology most unfavourably with its international and, in particular, its Continental rivals. The Committee noted that the rate of growth of productivity in this country had still lagged behind in the 1930s, in spite of the more widespread application of coal-face machinery, and attributed this in no small part to the retention

of ineffective and labour-intensive methods of transporting the coal from the face to the shaft-bottom, and to the constraints on output and productivity posed by inadequately-equipped shafts. And for the members of the Reid Committee, the re-equipment of the British industry had necessarily to involve the reform of the existing, fragmented structure of production. There were too many small pits with poor underground layouts, prohibiting the introduction of improved haulage techniques, while the productivity potential of face mechanization and improved haulage methods could be reaped only through the concentration of output on large-scale mines (Reid Report, 1945).

Management Success, Entrepreneurial Failure

In his analysis of the interwar British coalmining industry, Michael Kirby (1972, 1973, 1977) emphasizes the inability of mineowners to reorganize their industry by means of the amalgamation of colliery companies. Kirby acknowledges that there were company amalgamations in the interwar years, and that large firms became relatively more important. For example, he cites evidence furnished by government agencies in the 1930s which indicated the while over a thousand firms remained in competition in the industry, a third of British coal output was controlled by the industry's 25 largest companies, each producing in excess of 2 million tons annually (Mines Department, 1936, cited in Kirby, 1977:205-6). He also draws upon data presented in Buxton's work to show that there was a 'steadily increasing degree of ownership concentration in the major coalfields', and to the extent that, in 1930, 'seven undertakings in South Wales and under twenty in the Scottish coalfields controlled three-quarters of the output

in those areas, while in Northumberland four undertakings and in Durham, seven, were responsible for just over half the production' (1977:112). But Kirby disagrees with Buxton's argument that the industry was 'sufficiently integrated' and had realized all available scale economies (Buxton, 1970:488).

Following the contours of public policy debate in the interwar years, Kirby concludes that the amalgamation of firms into a smaller number of large units of 'unified management' would have benefitted the industry in two ways. Firstly, large undertakings would have been in a position to plan the working of a particular area and thereby realize the technical and commercial economies of large-scale production. Secondly, amalgamation would have facilitated the 'elimination of surplus productive capacity by the closure of redundant mines and concentration of output in the hands of the most efficient productive units' (1972: 655). Government reports in the 1930s suggested that while the British industry contained some impressively large undertakings, there was a 'lack of integration among middle-sized concerns' - or those producing between 100,000 and 1,000,000 tons annually - and indicated that over 40 per cent of industry output in 1935 came from 240 firms in this size range. Large numbers of very small undertakings remained in competition, and Britain's coal output continued to be raised from an exceptionally large number of mines. On the basis of this data, Kirby rightly concludes that the industry failed to reorganize itself 'on the lines advocated by official opinion' (1973:273). He suggests, however, that the failure of the interwar industry to restructure owed much to 'state interference'. He argues that there was a 'fundamental inconsistency' in the policy pursued by successive interwar British

governments in relation to the coal industry (and to Britain's staple industries more generally), that this 'inconsistency' was 'typified by the divergent objectives of the 1930 Coal Mines Act' (1973:273).

Part I of the 1930 Coal Mines Act established statutory marketing schemes - or sales cartels - at the level of individual mining districts. The aim was to restrict output and competition in order to maintain selling prices. A Central Council (composed of representatives of the mineowners from each of the districts) established industry output targets and allocated output quotas to each of the 17 districts. At district level, an Executive Board (composed of mineowners) distributed the district quota allocation among all the mines in the district, in accordance with 'standard tonnages'. Mines exceeding their output quota could be fined, while those which did not produce their full quota could sell part of it to other mines. Executive Boards were empowered to fix minimum sales prices for different classes of coal, but there was no central (industry) coordination of district pricing policies.

The statutory marketing schemes were closely identified with pre-existing voluntary schemes which mineowners had attempted to operate in the various mining districts in the late 1920s, in the wake of the 1926 lockout. For temporary periods, these voluntary schemes had embraced up to 80 per cent of owners in the respective districts. But they were unstable, because the forces of competition over markets were difficult to quell. Owners outside the schemes engaged in price-cutting, while those within them tended to break ranks at the sign of any upturn in trading conditions. The 1930 Act did not immediately circumvent these difficulties. Districts were slow to fix minimum prices, or fixed deliberately low pit-head prices, and there was dumping between districts with exporting districts 'invading' the more

stable inland markets. By 1936, however, the statutory schemes had been tightened-up.

Part II of the 1930 Act built upon the Samuel Commission's recommendations for the reorganization of the industry. It established the Coal Mines Reorganization Commission (CMRC) - a body charged with the responsibility for bringing about the amalgamation of colliery companies, with the aim of securing the concentration and modernization of production. The CMRC was ostensibly given powers of compulsion, subject to the judgement of the Court of the Railway and Canal Commission on whether the amalgamations would lower the costs of producing coal, be in the public interest, and accord with the financial interest of those directly involved. It encountered vehement opposition from the mineowners and, in 1935, when attempting to use its powers of compulsion in a test case, found that these were really non-existent. Thereafter, the activities of the CMRC were virtually suspended.

Kirby attributes the failure of compulsory amalgamation to the CMRC's mishandling of its relations with the mineowners; to the owners' resistance to amalgamations - 'whether voluntary or compulsory'; to their passionate belief in the virtues of laissez-faire and vigorous opposition to 'the policy of state compulsion' (1973:281). He argues, however, that the owners were able to resist amalgamations - whether voluntary or compulsory - because of the operation and relative success of the cartel schemes under Part I of the 1930 Act. On the basis of somewhat flimsy (and controversial) evidence, he contends that the rate of structural adjustment in the coal industry - amalgamation of firms and concentration of output - 'slowed down perceptibly' in the 1930s, in comparison with the preceding decade (cf Heinemann, 1944; and Boyns, 1987). He argues that this was because the

cartel schemes under Part I of the 1930 Act dulled competitive forces within the industry and therefore lessened the incentive for firms to pursue cost reductions through amalgamations, concentration of production and closure of inefficient mines. He concludes that the failure of rationalization in coalmining can therefore be attributed in large measure to inconsistencies in government policy.

Kirby's analysis, however, is founded on the assumption that cartels necessarily prohibit reorganization because they sustain the profitability of existing capacity and outdated production techniques. But this is a questionable assumption. Even if output and prices are fixed, increased profit can still be pursued through cost reductions - resulting, for example, from the concentration of output on fewer and better mines, and the development of large-scale pits was certainly permissable under the 1930 Act which allowed for the transfer of quotas between mines and the revision of standard tonnages. As Kirby documents eloquently, cartellization and reorganization were considered by many interwar observers to be complementary - the control of 'cut-throat' competition (through wage reductions) being viewed as (potentially) a means of promoting reorganization and the development of competition through productivity-enhancing innovations in production. This was not least because observers were aware of developments in the German coal industry, where cartellization had formed the prelude to the restructuring of capital ownership, reorganization and re-equipment of production (see Neuman, 1934; Lubin and Everett, 1927).

Kirby's analysis therefore fails to explain the apparent inconsistency in the mineowners' collective behaviour. They were moderately successful in organizing voluntary sales cartels, and accepted state support for price-

fixing schemes. But they failed to organize output at minimum cost, and rejected attempts to foster amalgamations under Part II of the 1930 Act. Kirby suggests that the policies pursued by the owners' national association - the Mining Association of Great Britain - were conditioned by the desire of owners' individually to retain operational control of their separate undertakings (1973:284; 1977:163). The Mining Association supported Part I of the 1930 Act in order to thwart compulsory amalgamation and preserve the managerial skills of individual colliery proprietors. This interpretation, however, falls back upon an explanation in terms of individual entrepreneurial irrationality - owners placed a greater premium on the experience of management than profit-maximization. It is not entirely convincing, moreover, since as Heinemann pointed out, while the Mining Association 'loudly pleaded the sufferings of the "small man" who would be gobbled up in a compulsory amalgamation, the agitation was also backed by the big combines, who had themselves gobbled up hundreds of small owners without shedding a tear' (1944:116). Nevertheless, irrationality is also a strong theme in an alternative, and more recent account, of entrepreneurial performance in interwar coalmining.

Entrepreneurial Failure

Michael Dintenfass (1988) presents his account of entrepreneurial performance in the interwar British coalmining industry as a critique of both Buxton and Kirby's work. Against Buxton's favourable assessment of entrepreneurship, Dintenfass argues that 'production and commercial strategies existed by means of which individual firms could prosper amid the depression and decline of the coal industry generally' and that these

strategies were not widely employed. He suggests that the failure to adopt these 'cost-reducing and price-enhancing' strategies cannot be attributed to exogeneous factors - matters of geology or economics - 'beyond the coalowners' control' (1988:33). But he also rejects Kirby's analysis which he treats as if it faithfully reflected Elbaum and Lazonick's 'institutionalist perspective' on British economic decline. He argues that the production of coal was increasingly concentrated on 'large-scale producers' during the 1920s and 1930s, although he also contends that economies of large-scale production were of minor significance in interwar British coalmining.

Acknowledging the productivity-enhancing potential of mechanized techniques of coal extraction, Dintenfass rejects Buxton's contention that the interwar British coal industry made the best possible use of these new extractive technologies. The failure to keep pace with the levels of mechanization attained abroad, he suggests, cannot be attributed to prevailing geological conditions, financial constraints or, for that matter, to workplace labour relations. From the results of his research into the circumstances of individual colliery companies, he finds no evidence of worker resistance to the introduction of mechanical coal-cutters and face conveyors.

But Dintenfass accepts uncritically Buxton's argument that 'technical' economies of scale were relatively unimportant, which is to say that he rejects Kirby's view that the concentration of production on fewer and better mines would have benefitted the interwar British coal industry. Insofar as he accepts that large firms might attain any advantage over their smaller competitors - and on this point, Dintenfass seems to be

unsure - he suggests that this was because they could attain 'organizational economies', or economies in the non-labour costs of production 'accounting for 30 to 35 per cent of the total costs of mining a ton of coal' (1988:15). Without clearly specifying the nature of these 'organizational economies', or how they might have been secured, he suggests that they were distinct from the 'commercial economies of scale' emphasized in Buxton's account and which Buxton defines in terms of bulk purchasing, marketing and distribution. Nevertheless, Dintenfass argues that 'astute commercial behaviour' could benefit individual firms. He suggests that pre-sale coal treatment techniques were available and which would allow firms with poor natural resources to secure better selling prices through the cleaning, grading, and blending of their coals (1988:24). He concludes, however, that Britain's mineowners failed to take advantage of these new sales practices and also failed to fully-exploit available internal 'organizational economies'.

In short, Dintenfass argues that there was a 'substantial measure of entrepreneurial inefficiency in the British coal industry of the 1920s and 1930s', and that Elbaum and Lazonick's 'institutionalist' explanation of British economic decline - 'with its emphasis on the persistence of atomistic industrial structures and "entrepreneurial" forms of business enterprise' - cannot account for this 'picture of colliery mismanagement' (1988:33). Dintenfass contends that mineowners had 'overcome the fragmented structure of the industry by the 1930s', that 'large-scale producers were raising the bulk of the country's tonnage', and that it was the 'inefficiency of corporate producers, not their absence' that accounts for the industry's deteriorating performance (1988:3,33). Since he rejects the existence of economies of large-scale production and questions the benefits

of 'corporate forms' of internal company management, however, at least two of his propositions are at odds with the case that he is trying to present and are certainly not supported by the available evidence. In any event, and as Dintenfass admits (1988:34), his analysis leaves a number of unresolved problems; for example, how can this apparently widespread mismanagement of collieries be explained, and why did so many inefficient producers survive the forces of competition?

Certainly the interwar British coal industry embraced some impressively large colliery companies. On this point all commentators are agreed. Even in 1913 there were a few firms with an annual output capacity in excess of 2 million tons (see Kirby, 1977:8), and many of the industry's largest undertakings grew considerably larger over the interwar years by merging with or acquiring other companies (which may have owned one, or several mines). Large firms became relatively more important, although in the interwar years commentators offered different interpretations of the extent of ownership concentration in coalmining.

Government surveys - on which both Kirby and Dintenfass draw - lend support to Kirby's view that capital ownership remained relatively fragmented at the end of the interwar period. They confirm Dintenfass's claim that, by the mid-1930s, 76 per cent of British coal output was produced by the industry's 146 largest companies, but not his contention that 'large-scale companies...dominated the coal trade' (1988:33). That is to say, 85 of these firms fell within the Mines Department's category of 'medium-sized' companies, producing anywhere between 100,000 and 1 million tons of coal annually (PRO,POWE 22/85, Mines Department, 1936). The 61 undertakings that fell within Dintenfass's definition of 'large-scale enterprise' - producing in excess of 1 million tons annually - together

controlled 55 per cent of British coal output. But 40 per cent of output came from 240 'middling-sized' firms, and over a thousand firms remained in competition although admittedly many of these were very small and accounted for a negligible proportion of industry output.

Table 2.3. Size Distribution of British Colliery Companies, By Output 1935

Size (output in ooo tons)	No.of companies	% of total saleable output
Under 10	522	0.5
10-100	149	2.6
100-250	90	6.8
250-500	82	13.3
500-750	38	10.1
750-1,000	30	11.7
1,000-2,000	40	24.3
2,000-3,000	12	13.0
Over 3,000	9	17.7

Source: POWE 22/85, Mines Department 1936, cited in Kirby, 1977:205-6 and in the above form in Supple, 1987: 362

With some notable exceptions, most of the company amalgamations of the 1920s and 1930s were confined within coalfield, or regional boundaries and a slightly different picture does emerge from official estimates of ownership structures at this more disaggregated level. Government surveys indicated that in most of the principal mining districts, a small group of firms controlled a significant proportion of regional output by the mid-

1930s, although they also emphasized the general significance of medium-sized undertakings (a category in turn embracing firms with vastly different output capacities). For example, in South Wales in 1935, five firms - each with an annual output in excess of 2 million tons - controlled 60 per cent of the coalfield's output. But approximately 200 firms remained in competition and while a very high proportion of these were tiny (134 Welsh coal companies, or 67 per cent of the total, each produced under 10,000 tons and together accounted for less than 1 per cent of the coalfield's output), about 30 per cent of output came from 40 firms each producing between 50,000 and 1 million tons annually. In Northumberland and Durham, 6 firms each producing over 2 million tons controlled 38 per cent of regional output in 1935. But nearly a third (31 per cent) of the North East's output came from 29 middling-sized undertakings.

Of course there is no reason to assume that the industry's largest undertakings were actually engaged in large-scale production. Government surveys are unhelpful here since they do not indicate whether individual firms were raising their output from large numbers of small-scale pits or from a few, large-scale mines. All that they reveal is that in each of the principal mining districts a very large number of pits remained in operation and that in the majority of districts the bulk of these pits were small-scale productive units. On the other hand, government surveys do not provide a comprehensive view of the changing structure of mine ownership.

For example, coal was not an homogeneous product and the production of certain types of coal was dominated by one or two large companies by the end of the interwar period. The principal example was the production of anthracite. By the mid-1930s one firm - Amalgamated Anthracite - controlled 80 per cent of the output of this type of coal, the production of which was

geographically concentrated in the western part of the South Wales coalfield (Supple, 1987:307). Vertical combination - or diversification - was also relatively well-developed. Thus, the mining of coking coal was rarely undertaken by specialist colliery companies. Rather it was organized by firms which, at the very least, combined coalmining with the ownership of coke ovens and, quite often, iron and steel production. In 1924, D.J.Williams argued that, via the process of vertical combination, the coal industry was becoming 'to an increasing extent, an auxiliary of the iron and steel industry' (p.97), and certainly in a number of districts in the 1930s, a significant proportion of regional output was controlled by a small group of 'great mixed' coal-iron-and-steel combines (Heinemann, 1944: 111-4; see also Supple, 1987: ch.9).

Diversification could take a variety of forms, and in South Wales the largest coal-producing companies (most of which were closely allied with iron and steel producers), established or acquired subsidiary coal-preparation firms, export and selling agencies (cf Dintenfass, 1988:24; and see D.J.Williams, 1924; Heinemann, 1944; Boyns, 1987). In the Nottinghamshire-Derbyshire-Yorkshire area groups of colliery companies, closely-linked through interlocking shareholdings, established subsidiary sales agencies to undertake their marketing and the purchase of their supplies. The principal examples are the Doncaster Collieries Association, the Carlton Collieries Association, and the Rotherham and District Collieries Association (Neuman, 1934; Heinemann, 1944).

Over and beyond the more formal (and readily identifiable) ownership connections between colliery companies, and between colliery firms and companies in other industrial sectors, extensive interlocking directorates and shareholdings linked nominally independent firms. These linkages were

not taken into account in official surveys of the distribution of output in the interwar coal industry, but their extent and complexity was stressed in other commentaries; for example, in the PEP's report on the coal industry, published in 1936, and in the publications of the Labour Research Department (Fox, 1935, 1935a; W.H.Williams, 1937, 1938, 1939; Heinemann, 1944). Indeed, including the financial interlinking between formally separate companies in her calculations, Heinemann estimated that in the early 1940s approximately 50 per cent of British coal output was controlled by just 25 coal combines (each with an output capacity in excess of 2 million tons). According to Heinemann, the two largest groupings - Staveley-Sheepbridge in the South Yorkshire-East Midlands area, and the Powell Duffryn Associated Collieries in South Wales - together controlled 18 per cent of industry output (1944:108). But she also noted that 'alongside these big groups there exist a number of "family" concerns' and a very great number of small colliery firms (Ibid:109).

Dintenfass does not cite Heinemann's work, although clearly it would give some substance to his claim that 'large-scale enterprises...accounted for a large and growing share of coal production in interwar Britain' (1988:17). On the other hand, Dintenfass is influenced by the PEP's report and refers to it as support for his thesis that 'organizational economies' were available to colliery companies but were not widely exploited by the coal industry's largest undertakings. His reading of this report, however, is highly selective. The report actually concluded that mechanization and the concentration of output offered the greatest scope for reducing unit costs in coalmining, and emphasized that mechanization 'may not...be wholly successful unless accompanied by concentration of output' on fewer and better mines (1936:33). It was from this perspective that the PEP's review

commented critically that the coal industry was 'still remarkable for the prevalence in many districts...of a great number of small producing units', and that 'the impetus' behind company amalgamations and financial interlinking in very many cases did not appear to have come 'from a desire to secure economies by managing a group of collieries as a group'. The report concluded that coalmining in Britain 'has come to have the appearance of an industry where financial unification and linking have proceeded further than technical and economic concentration' (1936:42-3).

In fact, since the PEP report placed great emphasis on internal company organization and argued that the 'success of (company) amalgamation' was critically dependent on the evolution of a 'suitable form of administrative machinery' (1936;64), it more closely corresponds with the 'institutionalist perspective' developed by Elbaum and Lazonick than with Dintenfass's interpretation of the coal industry's difficulties. For the former, a centralized, hierarchical managerial bureaucracy is the key distinguishing feature of the modern business corporation, and the 'successful' reorganization of production along mass production lines is argued to have been critically dependent upon such organizational innovation - the supersession of the market mechanism by the 'visible hand' of 'coordinated managerial control' within the modern capitalist corporation (Elbaum and Lazonick, 1982; see also Lazonick, 1980, 1981, 1982). Dintenfass simply reverses these propositions, arguing that 'traditional' forms of enterprise management were sufficient because in his view coalmining was a 'comparatively simple business' - one in which production remained small-scale and labour-intensive (1988:33).

The interwar British coal industry embraced some large undertakings which had rationalized their internal management structures along the lines of

the 'modern' business corporation; for example, Powell Duffryn, the Fife Coal Company, Manchester Collieries, and the Ashington Coal Company in Northumberland (see Supple, 1987:403-4; Boyns, 1987). But the internal organization of colliery companies was as varied as the size of firms operating in the industry, and the scale and organization of the production processes controlled by these companies. Certainly many coal combines appeared to be little more than holding companies, which brought formally independent firms under unified financial control whilst leaving the inherited management structures of the subsidiaries in tact. Elbaum and Lazonick suggest that the persistence of the holding company - or H-form of internal enterprise organization - in interwar British industry reflected the 'individualism' and insularity of British managers who resisted centralization in order to retain operational control of their family firms (1982). The Labour Research Department's work on the coal industry and, in particular, Heinemann's research completed in the early 1940s, presents a different interpretation.

Heinemann argued that the 'process of amalgamation and trustification' had gone a long way without 'bringing any solution' to the coal industry's difficulties because there had been comparatively little centralization and modernization of production. She noted that while mineowners had engaged in concerted action to resist state intervention and compulsory planned amalgamation, they had 'proceeded to carry out (company) amalgamations of their own on the lines promising the greatest immediate profit' (1944:115). Horizontal combines not infrequently comprised large numbers of small pits, geographically dispersed across a particular coalfield. Amalgamated Anthracite was a noteworthy example, 'with its huge galaxy of small, inefficient pits concentrated in one over-capitalised trust' (Heinemann,

1947:66). For Heinemann, such systems of amalgamation and financial interlinking represented attempts to secure the 'financial advantages of monopoly' rather than to lower unit costs through improved productive efficiency, while vertical integration - or diversification - had been pursued as a means of making and appropriating profits outside the coal industry. She emphasized the influence of wage agreements in coalmining on the investment policies of colliery companies. From 1921, wages were related to the profit on the sale of coal at the pithead, and there was therefore an incentive for firms to diversify - into by-product and coal treatment works, selling agencies, coke ovens and steelworks - or to transfer profits to related non-mining concerns through a low internal price (Heinemann, 1944:111). Thus, 'astute commercial behaviour' could greatly benefit colliery companies, although not necessarily for the reasons suggested by Dintenfass (1988:24).

From this perspective, therefore, it is possible to begin to see how apparently inefficient companies survived the 'discipline of market forces' (Dintenfass, 1988:33). Competition through increased productivity resulting from the development of large-scale, mechanized mines was not highly developed in the interwar British coalmining industry. The industry was not dominated by large-scale producers, even though it embraced large firms which in many districts controlled a significant proportion of output. There were various 'strategies' through which firms could maintain profitability in the short-term. Through organized collective activity mineowners had been able to depress wages in the early 1920s, and they had a measure of success in maintaining prices through cartellization from the late 1920s - the owners' voluntary schemes predating the 1930 Act. This hardly explains the policies and practices of the mineowners, however, and

does not provide an adequate account of the industry's inability to restructure and develop in the interwar period.

THE POLITICAL ECONOMY OF DECLINE

This thesis looks for an explanation for the British coal industry's changing performance and, specifically, its relative decline in the interwar period of the twentieth century, in its changing economic and social structure. Subsequent chapters explore the evolving pattern of labour relations. This chapter concludes, however, by summarizing the work of Fine et al (1985; and see also Evans and Fine, 1980, 1980a) on the changing relationship between landowners and mineowners. In Britain until the eve of the Second World War, landowners were in effect the coalowners since they owned and controlled the mineral rights - or rights to the coal underlying their properties. Fine et al show that the relationship between landowners and mineowners was conducive to the coal industry's expansion in the nineteenth century, but from the end of the century increasingly became an impediment to reorganization and modernization.

Fine et al's work is discussed at some length because it identifies the private ownership of coal royalties as a major factor contributing to diversity in the organization of production - and hence in capital-labour relations - in the industry. Thus, their analysis is not presented as an alternative explanation to one focusing upon the trajectory of labour relations. Rather, in examining the industry's failure to develop it is necessary to consider the character and interplay of relations between landowners, mineowners, and labour, and to interpret their interaction

against the background of broader economic and political developments including the contours of government policy.

Relations Between Landowners and Mineowners

In the literature on the British coalmining industry, the terms mineowner and coalowner are often used as if they were synonymous. But mineowners generally did not own the coal that they mined. Rather, they worked it under the terms of a mineral lease (or several different leases) negotiated with the mineral owner(s) - generally the owners of the surface property - to whom the mineowner, or colliery company, made a royalty payment.

The payment of royalties to private individuals was established by the 'great case of the mines' (Queen v. Duke of Northumberland) of 1568. This court case judged that all minerals, apart from gold and silver, belonged to the landowner in accordance with surface boundaries. The judgement was made absolute by the statutes of 1689 and 1693 (Nef, 1966:318), and with only minor amendments the legal framework laid down in the sixteenth and seventeenth centuries continued to govern the coal industry in Britain up until 1938 when the coal royalties were nationalized. On the Continent, in contrast, coal royalties were nationalized at the beginning of the nineteenth century, and while in the United States the same law applied as in Britain, the ownership of large landed estates and mines on those estates normally coincided (Fine et al, 1985:290; see also Samuel Report, 1926, Vol.1.:77)

Until recently, the influence of the private ownership of coal royalties had been relatively neglected in economic histories of the British coal industry. But the royalty system became and remained a contentious issue

throughout the interwar years of the twentieth century. Indeed, that the system was giving rise to tensions and difficulties was officially acknowledged in the late nineteenth century by the appointment of the Royal Commission on Mining Royalties of 1890-3. The Commissioners concluded, however, that there were only transient problems which could be resolved through negotiation and minor amendments to the law, and put forward arguments to support the continuation of private mineral ownership. These were basically the propostions of Ricadarian rent theory, suggesting that the predominant effect of royalties was to compensate for differences in natural mining conditions and thus ensure the optimal allocation of resources between mines.

Official enquiries in the interwar years, in contrast, were far more critical of the prevailing system of royalty ownership. All government-appointed bodies investigating the royalty system in this period recommended drastic legislative change, and for most of these bodies the appropriate change was to state ownership of the coal royalties - a situation that was eventually brought about by legislation passed by a Conservative government in 1938. The private ownership of mineral royalties was identified as an impediment to the planning and layout of mines, and hence to the rational development of the coal industry. But the official enquiries of the interwar years did not analyse the operation of the royalty system at a theoretical level. Rather, they noted the nationalized minerals of Europe and assumed that in Britain the private ownership of mineral rights formed a practical impediment to the coal industry's progress, giving rise to legal and informational complications for mineowners in having to negotiate multiple leases for expanding mines (eg Samuel Report, 1926, Vol. 1:76-7).

Fine et al, however, have argued convincingly that the royalties acted as an economic obstacle to the mechanization and amalgamation of mines because the increase in profitability associated with these changes could accrue to the royalty - or landowner rather than to the mineowner. Their analysis emphasizes the dynamic character of developments, the erosion of the formerly cooperative relationship between landowners and mineowners by capital accumulation towards the end of the nineteenth century, and the influence of the increasing antagonism between capital and land on the planning and layout of mines and diffusion of new production techniques. To follow their account, it is necessary to begin with some basic details of the operation of the private royalty system.

Where landowners developed the mines on their estates themselves (see below), there was obviously no need for a royalty payment. In other circumstances, some payment for extracting the coal had to be arranged and a mineral lease was drawn up between the landowner and prospective colliery capitalist. The mineral lease was a legally binding contract, and specified the terms of the royalty payments and conditions governing the mineowner's access to and removal of the coal from the landowner's property. Thus, while royalty payments are generally reported in official statistics as a payment on the tonnage of coal extracted, in practice mineral leases were far more complicated agreements (see, for example, Flinn and Stoker, 1984:43-9). Royalty payments were formally calculated in a wide variety of ways (although particular conventions tended to be observed within individual mining districts). Quite often leases were based on acreage, taking into account factors such as seam thickness. Royalty payments could vary on a sliding scale with the price of coal, and some combination of a fixed and proportional payment was common. Fixed or dead rents meant that a

lump sum charge was levied by the landowner irrespective of the quantity of coal extracted by the colliery company.

Leases were generally negotiated to cover a fairly long period of time; usually between 20 and 40 years, although sometimes extending to 99 years or more. But as Fine et al. have pointed out, this did not mean that the conditions governing the mineowner's access to the coal were fixed for some time in advance.

> Because of the varying conditions of the seams, there was frequent need for renegotiation and settlement between the two parties. Almost any major development in the running of the mine would have implications for the surface and be subject to the veto of the landowner. Neither the lease nor the law could anticipate and make provision for all these exigencies so that there remained an area of unnegotiated indeterminancy. In short, the negotiation and settlement of royalties was a complex affair, one in which each party was in a position to pursue an economic interest subject to the general and particular individual conditions that had already been laid down. (1982:6)

Such circumstances affected the mineowner's ability to engage in long-term planning, and incentive to make improvements to existing facilities. While the landowner could veto the tenant's proposed developments, equally the conditions for granting approval might deter the latter from embarking on new investment; for example, if the additional profits generated were likely to be appropriated by the landowner through higher royalty charges. In other words, where mineral and mine ownership remained separate, 'the pattern of colliery development - specifically the rate of mechanisation, layout, amalgamation and output growth - were strongly influenced by the terms of the agreements and compromises reached between the landowners and mineowners' (Fine et al, 1985:289).

Fine et al. give substance to these broad statements by examining the evolving relations between landowners and mineowners. On the Continent, as suggested, coal royalties were nationalized in the early nineteenth century. This was because the prevailing pattern of mineral ownership was highly fragmented, and the small size of landholdings relative to mining requirements presented an obstacle to the development of the coal industry (see also Nef, 1966:285). In Britain, in contrast, landownership was relatively concentrated and correspondingly the ownership of coal royalties was more concentrated within the various estates that contained coal measures (Ibid: 318). Initially this fostered cooperative relations between landowners and mineowners; a relationship that was conducive to the British industry's expansion in the early nineteenth century, even though within it the 'mineowner was subordinated to the landowner in a similar way to that of a tenant farmer to a large landlord' (Fine et al., 1982:7).

When the coal reserves of an estate were initially developed, a shallow pit or drift mine was usually sufficient to gain access to the seams lying near, or outcropping on the surface. The low cost of such operations and fact that even the deepest pits of the late eighteenth and early nineteenth centuries could generally be confined within the boundaries of a single estate, encouraged some landowners to develop the mines on their property themselves. Of course coalmining was often just one of several economic activities carried out on the landowner's property. Management of the estate was generally entrusted to a steward, bailiff, or land agent who in turn might engage a specialist mineral agent to organize coal production and sales on the landowner's behalf, while labour recruiment and management were often subcontracted to a charter-master or butty, who was usually a working miner or ex-miner (see chapter 4 below).

From the ranks of the land and mineral agents of the eighteenth century there emerged in the North East, and also in Scotland, the 'viewers' - or professional mining engineers of the nineteenth century. Like the land and mineral agents, viewers combined a wide range of managerial functions, but unlike the former - who were the servants of the estate owners - the elite 'consulting' or 'general viewers' were generally employed on a freelance, consultancy, or commission basis, and at any one time might be contracted to work for several mineowners and landed colliery proprietors. The emergence of the viewer network in the northern coalfield from the end of the eighteenth century has generally been attributed to the expansion of mining onto progressively deeper seams, increased complexity of mine development and working, and need to employ 'educated' and 'scientific' men to supervise colliery development in place of 'ill-educated' butty-men (see for example, Church et al.,1986:409-21). But the need to sink costly shafts to gain access to the coal seams and increased risks of mining investment also marked the diminishing involvement of landowners in financing the development of mines on their estates. More frequently, they sought to share the risks of mining ventures by encouraging capitalists to invest on their land, and here the viewers had an important - and, for individual consultants, lucrative - role to play. Thus, the landowner would commission the services of a viewer to 'view' - or survey and value - their property, and, possibly, to act on their behalf in negotiations with the prospective mineowner over the terms of the mineral lease.

Church et al (1986:122-3) estimate that less than 15 per cent of British coal output came from landed colliery proprietors by the 1830s, although they also note the regional variations in the pace of the landowners' retreat to a rentier status. Nevertheless, landowners continued to engage

their own surveyors and experts to evaluate the conditions and potential of their mineral rights, and in the early-to-mid nineteenth century not infrequently financed improvements to their estates - providing, for example, facilities such as transport and housing - to encourage the development of their coal reserves. Thus, while the mines were worked on lease, the mineowners and landowners entered into a 'relationship of mututal benefit and co-operation' (Fine et al, 1985:290); the former gaining access to the coal and the latter a share in the profits of mining.

This cooperative relationship, which encouraged the rapid extraction of coal, was preserved in the early-to-mid nineteenth century because the scale of mining was such that pits could be confined within the boundaries of a single estate and mineowners had thus to negotiate with only a single lessor. But as pits became deeper they expanded in size, representing the search for scale economies. And as mines began to expand across property boundaries, the cooperative relationship between landowners and mineowners began to break down. Fine et al argue that tensions and conflicts became common from the end of the nineteenth century as mineowners were required to negotiate conditions of access and royalty payments with several landowners. In other words, the development of the British coal industy was bringing into play problems with the private ownership of coal royalties that had plagued the establishment of the industry on the Continent at the beginning of the nineteenth century.

This much is confirmed by the appointment of the Royal Commission on Mineral Royalties in 1890, and the evidence reviewed by the Commissioners lends support to Fine et al's thesis that there were obstacles to the expansion of mines across property boundaries. For example, the Commission noted the widespread use of fixed or dead rents which meant that mineowners

had to make royalty payments even when they did not extract any coal. The effect may have been to encourage the rapid extraction of coal, although fixed rents could also tie a mineowner to a single landowner. That is to say, that instead of planning the extraction of coal on the basis of technical and geological criteria, 'mineowners would concentrate production within a single property in order to spread the overhead costs of royalty payments' (Fine et al, 1985:291). The Commissioners identified other difficulties of which the most important concerned wayleaves - a charge levied by the landowner on coal that was transported either above or below ground across their property. Where the coal had been exhausted on one property, the surface and shaft facilities of that mine may still have been essential for the extraction of coal from a neighbouring property. But the owner of the exhausted land could levy a wayleave royalty payment reflecting the value of the neighbouring estate.

As suggested, the Royal Commission of 1890-3 did not consider these and other difficutlies to be of major significance. Pointing to the British coal industry's hitherto successful record, the Commissioners could see no reason for changing the system of private mineral ownership and suggested that any difficulties could be resolved through minor amendments to the law. But their optimism does not appear to have been well-founded. In the interwar years, official enquiries emphasized the multiplicity of leases that had to be negotiated by each mineowner and viewed this as a practical impediment to the industry's development. But as Fine et al suggest, the royalty system was liable to present not simply practical, but also economic obstacles to the industry's progress. Mineowners faced the possibility that landowners would attempt to increase royalty charges as the profitability of the mines was improved. The precondition for any

investment - be it amalgamation or mechanization - was the negotiation of multiple leases, and the possibility that the additional profitability would be lost would act as a disincentive to investment. Fine et al note that in these circumstances mineowners would be encouraged to pursue other expedients guaranteeing production and profitability in the short run; for example, imposing reductions in miners' wages, forming cartels to raise the selling price of coal, and diversification into other industries where profits could not be so easily appropriated by royalty owners.

Fine et al stress that the difficulties between landowners and mineowners did not develop in a regular and uniform way, and they analyse the diverse effects of the royalty system in different mining districts.

> Not only did the timing and nature of the conflict vary, but the way in which disagreements were resolved differed widely across and within coalfields. The impact of the royalty system upon the development of a particular mine depended upon the local pattern of land ownership and the scope for renegotiation and compromise between landowners and mineowners as determined by general and individual economic and legal conditions. (1985:293)

They show that, contrary to the reasoning of the Royal Commission of 1890-3, levels of royalty payment did not correspond in any straightforward way to geological conditions. In the mid-1920s, South Wales and Scotland yielded the highest royalties per ton although these two districts were at the opposite ends of the spectrum in terms of mining conditions. In South Wales, mining conditions were good, but there was a low level of mechanization. In Scotland, geological conditions were poor, but mechanization was highly developed. Given the competitive conditions in its major export markets, mechanization was the condition for the survival of the industry in Scotland. But the highly concentrated ownership of land in

Scotland gave landowners the upper hand in their relations with the mineowners, and enabled them to extract a high royalty payment whilst at the same time tying mines to single estates so that they remained extremely small (Fine et al, 1985:293-7).

Equally, however, Fine et al emphasize that the impact of the private ownership of coal royalties on the overall development of the British industry cannot be assessed by simply comparing different mines, or different mining districts (cf Dintenfass, 1988:32). By weakening the incentive to invest in specific regions, 'the royalty system tended to erode the coercive forces of competition throughout the industry and hence had a constraining and negative impact on its long-term development' (Ibid: 298).

Similarly, any assessment of entrepreneurial rationality in the coal industry should focus on the mineowners' collective behaviour. In the years immediately after the First World War, the mineowners' national association - the Mining Association of Great Britain (MAGB) - displayed a remarkable ambivalence in its position on the private ownership of royalties. Together with all other parties represented on the Coal Industry Commission (the Sankey Commission) of 1919, the mineowners concluded in favour of the nationalization of coal royalties. By 1920, however, the MAGB was actively campaigning against state acquisition of the royalties, and proposing legislative changes that would leave royalties in private hands but increase the rights of access of mineowners to the land (*Colliery Guardian*, 30.4.1920:1223; see also Coal Association, 1920). The MAGB's change of heart may well have been conditioned by the political climate of the times. A majority on the Sankey Commission had concluded in favour of the nationalization of the mines - the Chairman siding with the mineworkers'

representatives against the mineowners. The MAGB's principal spokesmen thereafter urged that state acquisition of the mineral royalties should be resisted because it could undermine objections to state acquisition of the mines (Lord Gainford, cited in *Colliery Guardian*, 5.3.1920:664; see also MAGB:1924). By the 1930s, however, there was increasing support for nationalization of the royalties, and this was accomplished in 1938 with the only opposition coming from the royalty owners whose own association (the Mineral Owners' Association of Great Britain) would appear to have been holding out for more favourable terms of compensation (Fine et al, 1985:287).

Labour Relations

The British coal industry's changing performance cannot be understood simply in terms of the growing antagonism between landowners and mineowners. This thesis explores the trajectory of capital-labour relations. It is not an institutional account of trade union and employer organization, and makes no pretence to document at length the history of the industry-wide disputes, lockouts and strikes of the period under examination. Much of the detail on the latter is to be found in the extensive literature on the industry and industrial relations in British coalmining in the interwar period (see, for example, Kirby, 1977; Supple, 1987; Arnot, 1949, 1953, 1961), while histories of the district and county miners' trade unions have already been completed. The thesis attempts to establish the basis of the capital-labour struggles of the period by placing a central emphasis on the conditions of work, and considers the implications of the outcomes of industrial conflict for the industry's development.

It looks firstly at labour utilization in the period before the First World War. Hand coal-getting remained the dominant technology of coal extraction, but across the British coalfields structures of work organization were remarkably diverse. Miners were not automatically united by a common experience of work, and the regional variations in work organization combined with divergent terms and conditions within individual mines, to present obstacles to the achievement of solidarity. From the early twentieth century, the mineworkers did achieve a growing unity around the demands for a national wage structure, better safety provision, and reductions in the length of the working day. But mineowners could not agree to make broad concessions. Divergent geological and market conditions, and different structures of work, meant that the effects of uniform restrictions on labour utilization would be borne unevenly by different sections of the industry, while national wage bargaining would curtail the owners' ability to respond - as in the past - to changing conditions locally by lowering wage rates. The deepening conflict within the industry brought the state more closely into its affairs. Government controls during the period of the First World War made possible the concession of industry-wide wage advances, and the miners pressed for the extension of these controls, or for the nationalization of the industry.

The mineowners strengthened their own national federation, conceding powers to the MAGB in order to ward-off nationalization and external attempts to orchestrate restructuring. Often interpreted as an expression of their 'individualism' or commitment to the virtues of laissez-faire, the owners' inability to form a policy for the reorganization of the industry has to be related to variations in market conditions and to the divergent conditions under which production was organized. Mechanization in the

interwar period, discussed in chapter five, was a protracted and uneven process. Systems of hand coal-getting and partially-mechanized mining coexisted in the same mining districts and often in a single mine. Mineowners could not agree to uniform provisions as, for example, in the areas of health and safety, and the implications of this for the costs of reproducing labour power are discussed in chapter six. The owners' 'individualism' in their business affairs and 'solidarity' in their dealings with labour and with government may be 'far from paradoxical' (Supple, 1987:410), the latter sustained to preserve maximum individual discretion. But the inability to construct a common, long-term approach towards wage and employment regulation in turn served to dampen the forces for change, modernization and restructuring.

CHAPTER THREE: WORK ORGANIZATION IN THE BRITISH COALMINING INDUSTRY BEFORE THE FIRST WORLD WAR

INTRODUCTION

This chapter looks at work organization in the British coalmining industry, and is principally concerned with the period before the First World War. Coal production in Britain in the early twentieth century remained a labour-intensive process. The industry's expansion over the nineteenth century had been dependent upon the extension and intensification of working hours, rather than the transformation of production methods. Some mechanization had taken place by the beginning of the twentieth century. But this had largely been confined to surface operations and the construction of mine shafts, leaving the process of coal extraction largely unchanged. So 'lavish of the effort of muscle and tendon' (Court, 1945:6), the industry's development had necessarily been dependent upon a huge supply of labour. Between 1840 and 1913, there had been a ten-fold increase in the numbers employed in coalmining, and on the eve of the First World War approximately 1.1 million men and boys were employed in the British coal industry.

Economic and social historians of the nineteenth and early twentieth century British coalmining industry have emphasized the difficulties in regarding it as a single, or homogeneous, industry. It was geographically fragmented, and geological conditions varied markedly between and also within the industry's constituent coalfields. The coal that was mined varied in its physical and chemical properties. Colliery companies raised different types of coal for different economic uses and markets, so that

those 'who run the mines think of themselves as supplying their customers with gas-coal or coking coal or household coal or large steam coal or some other variety which is in demand' (Court, 1945:6). Divergent geological and market conditions have been identified as the source of the 'widely divergent and sometimes as a consequence opposed' economic interests of mineowners (Ibid:2), with a principal line of cleavage often perceived to lie between coalfields oriented towards the export trade and those producing for inland or domestic markets. Daunton's (1981) analysis of work in the great Northern and South Wales coalfields - the British industry's leading export districts - has shown, however, that a potent source of division also lay in patterns of work organization which varied between districts with an ostensible economic similarity.

Thus, while this chapter begins with a basic typology of the different grades of underground labour in coalmining, it must be emphasized that this gives little indication as to the actual working methods and practices in the different coalfields. Hand coal-getting at the face predominated in 1913, with only 8 per cent of British coal output undercut by machinery in that year. Colliers performed the complete operation of winning the coal and retained immediate control over the pace of work. They were subject to limited direct managerial supervision. Their relative autonomy in production was buttressed by the piece-rate system of payment which, for employers, provided an indirect control on the intensity of work effort. Colliers retained immediate control of the labour process, but employers were concerned with the way in which work was organized and intervened in various ways in their attempts to maintain effort and discipline in production. In other words, variegated structures of work organization were

only in part a function of geological conditions. They also reflected the outcome of struggles between mineowners and mineworkers.

The chapter explores some of the ways in which work organization and working practices varied between mining districts. It shows that variegated conditions of work created a diversity of interests amongst mineworkers. Far from representing an occupationally homogeneous workforce, the coalmining proletariat of the nineteenth and early twentieth centuries was divided in complex ways and the chapter examines the influence of working conditions on the development of labour organization. Mineowners were also divided by geological and market conditions, and by the variegated structures of work in the industry, and these divisions had major ramifications for the formation of a common employer policy. This is illustrated by a discussion of the mineowners' response to the growing unity achieved by the miners from the early twentieth century around the demands for a uniform, industry-wide limitation on the length of the working day and a national wage structure.

THE WORK PROCESS AND UNDERGROUND EMPLOYMENT STRUCTURES

The operations involved in the extraction of coal and its preparation for the market can be divided into distinct categories; hewing, putting at the face, the conveyance of coal along primary haulage routes, winding to the surface, and preparation at the surface. In addition, there were certain essential maintenance tasks; 'deadwork' at the face, advancing the face, driving and maintaining the underground roads. These functions were common to the industry in all regions, but the allocation of these tasks between different grades of workers varied in the different mining regions.

In his evidence to the Sankey Commission of 1919, Finlay Gibson on behalf of the mineowners' national association (the Mining Association of Great Britain) identified six distinct classes of underground labour in the British coal industry which roughly accord with the operations listed above. It is useful to consider Gibson's classification (cited in Rowe, 1923:55-6) in order to gain a basic grasp of the various grades of workmen. It must be emphasized, however, that there was no uniformity in the social organization of production across the coalfields. The allocation of tasks - as, for example, between colliers and other specialist grades - varied between mining districts, as did the forms of remuneration (piece- or time-rates) for different grades, length of shift worked by colliers and other grades, internal patterns of promotion to the face and other specialist piece-work occupations. These variations, as Daunton (1981) has shown, gave rise to distinctive social relationships in the different coalfields and hence to divergent labour responses to changes initiated by employers or imposed on the industry as a whole through legislation.

Gibson's first two classes - (1) piecework coal-getters and (2) coal-getters on a day wage - embraced the men who won the coal at the face. Both groups were classed as skilled workers and in most districts pieceworkers easily outnumbered day-wage men. Their actual job titles varied. They were 'hewers' in Northumberland and Durham, in Cumberland as in Lanarkshire; 'colliers' in South Wales and in Lancashire; and 'stallmen' or 'contracting colliers' in certain coalfields in the East and West Midlands. In the latter, the butty system persisted - in various guises - well into the twentieth century. Under this system, faceworkers were employed by a contractor who was in turn employed on a piece-rate system by the mineowner or manager. The contractor or 'butty' paid his men a day-wage and,

possibly, a bonus from the contract earnings. This system was by no means confined to the Midlands. Through the nineteenth century it was periodically re-introduced in some districts, and it was adopted in the interwar period of this century in the newly-developing Kent coalfield (Goffee, 1981). It is examined in detail in chapter four.

Gibson's third class comprised putters, fillers, hauliers and trammers. It was further sub-divided between (a) semi-skilled men qualifying as coal-getters and involved in the filling of coal into tubs and/or pushing the tubs out to the secondary haulage system, and (b) semi-skilled men who drove the ponies or horses which pulled the tubs from the face to the primary haulage sytem in the main roads. Methods of payment varied for both groups, which is to say that in some districts they were paid piece-wages and in others day- or time-rates. Subcategory (a) was in practice in some coalfields subsumed within class (1) where colliers worked with an assistant or learner to whom they paid a day-wage from their piecework earnings.

Class (4) embraced timbermen, stonemen, brushers or rippers; men who were classed as skilled workers and who were variously employed on piece or day-wages in the different coalfields. Timbermen erected the props to support the underground roads and also the face where this work was not performed by the colliers or, as in the North East, by the coalface deputy. Stonemen (or roadsmen) drove the roads giving access to the face, while brushers and rippers raised the roof and floor to advance the face where this was not part of the collier's work. The numbers employed on this work depended to an extent on whether or not colliers performed much of the 'deadwork' at the face.

Class (5) comprised deputies, firemen or examiners - men responsible under the Mines Acts for the general safety of the pit. Since these men were generally also charged to act as under-foremen, they were properly classified as officials of the colliery company. They were paid a day-wage and sometimes a standard weekly wage. Their changing role in the mine - from safety officer to production foreman - over the interwar period of the twentieth century is discussed in detail in chapter six. Gibson's final class (6) - other underground labour - included men working on the primary haulage system; assistants to the stonemen and timberers; pumpmen and enginemen; and general labourers. They were nearly all paid day-rates and sometimes a standard weekly wage. To reiterate, however, this typology provides only the roughest of guides to the composition and work of the underground labour-force since, 'the methods of labour and systems of payment vary so much between coalfields that in each coalfield one finds peculiarities within this nominal classification' (Rowe, 1923:57).

With the increase in the scale of mining enterprise over the nineteenth century, certain changes had taken place in the organization of production. The pace of these developments was uneven as between coalfields and mines operating within them. At the surface, increasing attention had been paid to the grading of coal and its preparation for the market. Surface workers - employed in the movement and preparation of coal, as well as the maintenance and repair of colliery equipment and care of livestock - formed 20 per cent of the total British mining labour force in the early 1870s, and about the same proportion in 1913. But the proportion varied between and within coalfields, from 25-27 per cent in South Staffordshire to 14-16 per cent in South Wales (Church et al, 1986:209). The apparent overall stability in surface employment in a period when more tasks were being

performed at the surface is possibly to be explained as the result of technical innovation. Mechanical screens and washing plant were increasingly adopted from the 1880s (John, 1984:69-96; Louis, 1924:204-218) and the partial automation of weighing, screening, washing and tippling offered employers the opportunity to intensify the work of surface hands.

Improvements in boring, shaft construction and sinking techniques, and the application of steam-power to winding and pumping from the 1830s (and some time earlier in the North East), facilitated the working of progressively deeper seams. Continuous refinements to access technology were made over the nineteenth century (see Church et al, 1986: ch.4). From the 1840s, there had also been improvements in underground ventilation systems, and changes in the methods of transporting coal from the face to the shaft for winding to the surface. Improvements in underground haulage techniques had to some extent been stimulated by the Mines Act of 1842, which prohibited the employment of women and young children underground (see chapter 4), but the sinking of deeper and more costly shafts was also an important stimulus since such fixed capital outlays had to be recouped over a larger (and more regular) output. At the face, wheeled trams, tubs or wagons running on light rails displaced hand-pushed sledges. Where the height of seams allowed, ponies were used for putting at the face. On main-road, or primary haulage routes, horses were increasingly used in place of (or in conjunction with) human effort, and rope haulage systems were employed at some mines from the mid-nineteenth century. The use of 'endless chain', 'endless rope' and 'main and tail rope' haulage systems, powered by stationary engines, increased from the 1870s. But the use of horses for main-road haulage systems continued at many pits into the twentieth century, as did hand-tramming and pony-putting at the face.

It is difficult to ascertain the proportion of underground employment formed by 'oncost' workers, employed on work other than coal-getting at the face. This is not least because official statistics do not differentiate between colliers (regarded by owners and managers as the 'productive' labour force) and other grades, and also because of the regional variations in the division of labour. The best estimates are given by Church et al (1986:211-5) who suggest that in 1905, the proportion of underground workers employed on hewing at the face varied from 47 per cent in the North East to 56 per cent in South Wales, and 60 per cent in Scotland (see also Daunton, 1981).

COAL-GETTERS: TRAINING AND PROMOTION TO THE FACE

As a 'workable mechanical novelty', the coal-cutter had been in existence since before the 1880s (Taylor, 1961:58). But as late as 1913, only 8.5 per cent of British coal was undercut mechanically, with 22 per cent of this total accounted for by the Scottish coalfields (Rowe, 1923:9). Hand coal-getting therefore remained the predominant method of coal extraction on the eve of the First World War, and colliers continued to perform the complete operation of winning the coal at the face. This comprised three principal processes - undercutting (holing or kirving), ripping (or getting the coal down), and filling the coal into the tubs brought to the face by haulage workers.

Undercutting was the most arduous and dangerous part of the collier's work. With the aid of an iron pick or, from the 1880s, a 'patent pick' or 'mandril', he had to cut a deep groove at the bottom of the coal seam, placing timber 'chocks' to support the weight of the overhanging coal in

the process. The coal was then 'got down' either by allowing it to fall under its own weight, or by driving in wedges at the top, or with the aid of explosives. The collier (or his helper or learner) then had to fill the coal, with the aid of a shovel, into the tubs. Certain 'deadwork' tasks also had to be completed in preparation for further operations. The face had to be cleared of dirt or rubble; the roof had to be raised above the face; and timber props had to be set to support it. These 'deadwork' tasks might all be performed by the collier working with a day-wage assistant, by two colliers working together in a stall and sharing their earnings equally, by particular members of the coalface work group on longwall faces, or by other specialist grades of underground workers. Variations in the allocation of 'deadwork' tasks had a bearing on the nature of supervisor-worker relations at the face, and are discussed in greater detail later in this chapter.

The collier had a complete set of operations to perform - cutting, ripping and filling - and upon his skill, physical strength and dexterity were dependent his daily or weekly piecework earnings. He enjoyed an earnings differential above other grades of underground workers. By virtue of the nature of his work and the piece-rate system, he enjoyed an autonomy in production which other grades of underground workers - and notably haulage workers - did not possess. Certainly the degree of independence which colliers enjoyed varied between coalfields and over time, which is to say that their autonomy was not inviolate. Nevertheless, prior to the introduction of mechanical coal-cutters, the deputy had little role to play in coordinating the various operations at the face and the collier decided how best to win the coal, in which sequence to perform the various tasks

and, within the constraints of the piece-rate system, determined his own pace of work.

Commentators in the interwar period of the twentieth century, witnessing the transition to the unit or intensive system of machine-mining, looked back upon the pre-war, pre-machinery years as the halcyon era of the collier as 'master craftsman'.

> He toiled with his assistant, usually a young lad, in a "place" of his own, where he was practically his own master.....He was a skilled craftsman on a piece rate, so there was no need of an overseer directing his activities. No one knew better than he did how to blast the coal to best advantage or how to secure the roof so that it would not cave in upon him. The work was unhurried, so that the workman had plenty of time to instruct his assistant. He taught him how to wield a pick, how to guage the quantity of explosive necessary, how to detect inflammable and poisonous gases, how to recognize a dangerous roof and support it.....So by this method of training, the miner's assistant of pre-war days became a skilled craftsman - in his isolated working place he was a master craftsman, in the same position, in many respects, as the small tradesman owning his own business. He could organize the work to suit himself - work as hard as he liked, and, to a great extent, as long as he liked. (Mitchell, 1933:140-1)

This picture of the 'old-timer miner at work' rather misinterprets the nature of the piecework system. Colliers were not paced by machinery, or subject to close managerial supervision, but they nevertheless had a 'stint' of work to complete to attain their average earnings, and would be forced to intensify their work-load when wages were depressed. Colliers were free from close supervision, but not all faceworkers enjoyed a similar autonomy and piecework coal-getters exercised a hierarchical control over their day-wage assistants (see chapter 4). The less glamorous aspects of

the collier's work and working conditions are also ignored. Hewing was a physically strenuous and dangerous job. It required skill to be peformed effectively and also safely. Colliers worked long hours - over ten hours bank-to-bank in South Wales before the legislation of 1872 - in dark, sometimes very hot, sometimes flooded, often cramped and invariably hazardous conditions.

On the grounds of safety alone, mineworkers had ample cause to take an interest in their employer's recruitment practices, since the introduction of 'strangers' or inexperienced workmen represented a potential safety hazard for all underground employees. But the collier's skills, acquired through some form of apprenticeship, and experience of underground work might alone be insufficient to ensure his personal safety. On average in the years between 1880 and 1910, four miners were killed every day in the British coalfields (Arnot, 1953:23).

Colliers resented the introduction of 'strangers', viewing this as a threat to their safety, to their earnings and to their status at the top of the underground employment hierarchy. In all coalfields in the nineteenth century, some form of apprenticeship system operated, with access to piecework employment at the face and to specialist underground jobs governed by 'age-linked milestones' (Humphries, 1981:10). But the details varied between different coalfields, in terms of the length of apprenticeship required before promotion to piecework employment at the face, the route to employment at the face, and extent to which these systems were regulated through the family or kinship network, local custom or local union organization. For the industry as a whole, therefore, and even for individual mining districts, there was no formally recognized apprenticeship system guarded in the union rule books although in some

coalfields the unions attempted to formalize 'entry to the trade' in the mid-to-late nineteenth century (Reid, 1978).

The length of apprenticeship required before promotion to the face varied in the different coalfields; to some extent reflecting geological conditions. And the skills acquired through a training in one coalfield might be insufficient to guarantee a man work in another.

> .....among the colliers themselves, I am informed, so great is the value of a particular training and aptitude, that there are distinct classes of "thick-bed men" and "thin-bed men", of whom the "thick-bed men" cannot gain a living at the work of the "thin-bed men", while surpassing the latter in their field of employment. And beyond the physical labour, there is required a familiarity with the peculiar dangers of the occupation, and a caution in guarding against them, which nothing but long experience can supply. (Trades Societies and Strikes, 1860:13-4)

In the North East, where the coal was hard and difficult to work, a lengthy formal apprenticeship was considered - by owners and men - to be essential. Likewise in South Staffordshire where the 'thick coal' seam was worked by a distinctive method, only adopted in this coalfield (Eight Hours Day Committee, Final Report, 1907). According to Campbell and Reid, however, the thickness of the newly-opened seams in Lanarkshire in the mid-nineteenth century allowed the coal and iron companies to recruit relatively inexperienced labour from Ireland and elsewhere (1978:59).

The path of promotion to the face varied in the different coalfields. In the North East, adolescents entered the pits as 'drivers', employed in driving the horses on the main underground roads. They advanced to putting at the face between the age of 16 and 18; graduated to become a 'putter-hewer' after a year or so; subsequently moving up into the 'hewer-putter'

class before becoming a hewer proper with their own 'stall' and, in this coalfield, marra partnership with another skilled worker (Daunton, 1981: 591). In South Wales, in contrast, there was no line of promotion from haulage work to coal-getting at the face. While coalmining in Britain in the nineteenth century was popularly regarded as an 'hereditary closed shop' (Hair, 1955:49-50), with entrance to the industry being restricted to juveniles from mining families (see chapter 4 below), in South Wales the 'different grades (were) as much as an hereditary occupation as mining in general' (Rowe, 1923:67). Colliers worked in their 'place' with a learner, or day-wage assistant, who was usually under the age of 21 and often a son or relative. In this way, the sons of colliers would learn their trade and follow in their father's occupation, graduating to a 'place' of their own in their early twenties. The sons of hauliers and of timberers were likely to follow in their father's occupation, although possibly starting work as a collier's assistant.

Thus, while there was a tension between coal-getters and haulage workers, with the latter in all coalfields an 'inferior' grade, the nature of this tension assumed a different character in different areas. In South Wales, 'adults were divided on a line between face and haulage work, which in the North East was a division of age' (Daunton,1981:591). In the North East, haulage workers had the possibility of promotion to the face, but in the interim had to work a much longer shift than hewers. In South Wales, haulage workers remained in this grade all their adult working lives, but worked the same length of shift as coal-getters (see below, pp 121-3).

While coal-getters resented the introduction of 'strangers', or breach of the apprenticeship system, it was by no means unknown for mineowners to recruit from outside the established mining proletariat, or to recruit

relatively inexperienced workers to the face when (a) skilled labour was in short supply and geological conditions permitted; (b) owners encountered opposition from the men to their stated terms and conditions of employment; and (c) owners encountered resistance to their attempts to intensify work. In the Royden Harrison collection (1978), the heavy recruitment of labour to the industry from the 1860s is argued to have been perceived by colliers as a threat to their earnings and artisanal status, and to have initially provoked a more concerted effort on their part to formalize apprenticeship regulations. But these attempts to control the labour supply along the lines of 'classic' craft societies were unsuccessful in the face of the employers' ability to draw-in 'poverty-stricken' migrant labour and workers from other occupations - albeit at the expense of safety and efficiency. Taylor also argues that the expansion of the industry from the 1880s sucked in a 'large body of inexperienced workers' - 'green' labour, or raw recruits (1968:50-1).

There is some disagreement as to the extent of this 'dilution', however, and obviously regional variations would be important. Taylor does not differentiate between recruitment to the face and other types of underground work. Walters' figures for the South Wales area (one of the most rapidly expanding coalfields in the late nineteenth century) give a more detailed breakdown. They suggest that in the 1890s, unskilled labour - with less than two years experience of minework - accounted for 5 per cent of the labour force in the collieries of the Merthyr and Aberdare areas, but that only 1 per cent of these new recruits were coal-getters at the face (1975:294-5).

While the recruitment of relatively inexperienced workers did not alter the nature of operations at the face or, necessarily, facilitate the

imposition of a tighter work discipline, there is some evidence of mineowners turning to alternative sources of labour in an attempt to undermine established job controls and/or to force striking miners back to work. In such circumstances, owners would generally attempt to recruit from similar occupational groups as in the North East, in the 1830s, when they hired workers from the (depressed) neighbouring lead mines to crush the hewers' strike over the conditions of binding.

> Indeed the masters soon persuaded themselves that it was a positive charity to give these distressed lead miners work, and the objections of the pitmen to this course was a 'heartless combination against their industrious but starving fellow creatures'. (Hammond and Hammond, 1919:37-8)

In the North East in the 1880s, owners at a number of pits recruited putter-hewers onto coalgetting at the face. Putter-hewers worked a longer shift than adult hewers and did not enjoy the latter's privileges in terms of rent-free accommodation and a coal allowance. Thus, while there was a continuing tension between the hewers and the younger men awaiting promotion and who were 'convinced that they were fit to hew' (Welbourne, 1923:232), antagonism was increasingly directed towards the owners who were willing to employ the younger men but not to grant them the same conditions as hewers. Following a series of local disputes, the lodges (or workplace union organization) succeeded in ensuring that the 'obnoxious system of infringement of the hewers' work (was) abandoned' (Ibid:252).

In certain districts in Scotland in the early twentieth century, mineowners recruited immigrant Polish mineworkers in place of the indigeneous mining population, arguing that they found the Polish workmen to be 'good workmen, and they would undertake work which other men would not do' (Mining Association, Executive Council Minutes, 6.5.1903:12-13).

The owners' particular grievance was that Scottish hewers had imposed output controls, or rather were refusing to work the length of 'stint' defined by the masters. The Editor of the *Colliery Guardian*, the industry's trade journal, commented with some satisfaction that:

> It certainly looks as though the worm was turning at last, and that colliery owners, sick and tired of the attempts of the men to become their masters and to control their businesses for them, have resolved to make a clean sweep and seek for more amenable labour elsewhere. Perhaps this will prove a solution to the trade union question, and, although it would cause an infinity of misery to the workmen of this country, it must be admitted that they have brought it upon themselves. Perhaps when the unofficial members of the trade unions see the danger which is looming before them they will take a more reasonable course while there is yet time.
>
> *(Colliery Guardian, 18.1.1901)*

The regulation of output, practised on an informal and local basis, represented one tactic through which colliers attempted to prevent the intensification of work or extension of the working day under the piece-rate system. It was, however, also closely associated with the outlook and policies of the district and county miners' associations of the 1870s and 1880s. Wages (percentage increases or decreases to basis rates - or piecework earnings) were regulated at a district level under selling price sliding scales (discussed in the final section of this chapter). The restriction of output - practised on a national scale - was viewed as a means of maintaining selling prices and, with this, wage rates.

THE PIECE-RATE PAYMENT SYSTEM

The piece-wage was the dominant form of wage for coal-getters at the face. Piecework price lists stipulated the prices paid for particular jobs; for example, so many pence per ton for getting the coal and loading it into tubs. This rate might include an allowance for so many yards of putting at the face, as in Cumberland where the hewer was responsible for this work, and possibly for the day-wages of his assistant or learner. Separate rates would be stipulated for timbering at the face, ripping the roof and so on.

Piecework price lists were determined locally, at the level of individual pits (or seams within them), usually through a process of bargaining between the management and men. Price lists were not fixed once and for all, however, and occasions did arise fairly frequently when either the employer or the men would press for a revision. For example, if geological conditions changed, the colliers might be forced to work more intensively at existing rates, while falling coal prices might be the occasion for the employer to attempt to cut existing rates, thereby forcing employees to work more intensively to secure their average earnings. New price lists had also to be established when new faces were opened-up, and changes in working practices would also precipitate attempts to alter prevailing piece-rates.

The situation in coalmining can therefore be contrasted with that in the cotton industry, where formal price lists covered large sections of the industry and provided for 'changes in process, machinery, or character of product, and no bargaining takes place after the list has once been drawn up' (Rowe, 1923:50). In coalmining, there were no formal, or fixed, price lists applicable to whole districts and, with the exception of the northern

coalfields, before the 1890s the external (district or county) union had no recognized role in the negotiation of rates at the level of individual pits. While there were no formally recognized standard, or minimum rates, however, there was usually a 'customary day-wage for face-workers by which a man could assess the 'fairness' of a particular rate' (Clegg, Fox, and Thompson, 1964:110), and colliers would expect the price lists to yield the 'normal earnings per shift' for their grade in a particular locality.

It is important to emphasize that piecework price lists were not related to the selling price of coal. The piecewage was simply a converted form of time wage, and the determination of piece-rates involved the division of two principals; the customary, or average wage, and the 'amount of work which an operative of average capacity, working with such degree of exertion as the average workman is willing to exercise, is able to produce within a given period' - within the length of the working day or shift (Schloss, 1892:22). The piece-rate established, the actual wages of the operative would depend on the amount of work actually performed - number of pieces produced, tonnage of coal cut and filled, yardage of roadway timbered - multiplied by the job rate. Providing a measure of the intensity of labour, the piece-wage rendered the 'superintendance of labour....to a great extent superfluous' (Marx, 1976:694). In his analysis of the bituminous coal industry in the United States in the 1920s, Goodrich noted that the miner's freedom from direct supervision was buttressed by the piecework payment system which relieved the foreman of the 'necessity of driving the men' (1925:30).

Piecework payment systems were widespread in British industry in the late nineteenth century; in factory employment and in domestic manufacture or outworking trades. They were associated with various forms of

subcontracting, inside contracting, piece-rate foremanship and, in some occupations, 'sweating'. For Marx, the piece-wage was the form of wage 'most appropriate to the capitalist mode of production' and specifically to the 'period of manufacture properly so-called' (1976:698). The piece-wage, he argued, served as a 'lever for the lengthening of the working day and lowering of wages'. It tended to develop the 'worker's sense of liberty, independence and self-control' and with this encouraged employees to intensify their work-load or prolong their working day in order to increase their piecework earnings. The knock-on effect, however, was to raise the intensity of work for all employees in a shop or workplace, or to extend their working day and force them into over-exertion. For employers would 'keep an eye on the men's earnings and, if (they) think that they are making too much money, will lower their piece-wage by "nibbling", i.e. by an insidious process of continual petty reductions' (Schloss, 1892:45).

In practice, however, this process owed much to employer initiatives. Thus, Melling argues that piece-rate payment systems in the late nineteenth century were most prevalent in 'those occupations possessing little claim to craft expertise, *or* where the existence of job control excluded the possibility of intensive management supervision'.

> In such situations the expense of supervisory labour could be reduced by ensuring that piece or job rates stimulated the employees to greater exertions, and by cutting the rates so that a progressive increase in productivity was secured. (1980:191-2)

Employers might, of course, encounter worker resistance to such intensification of labour exploitation. This might take a number of forms, from output restriction to an insistence upon a base rate, with 'one of the

most effective means of protecting standard rates and job controls....obviously in trade unionism' (Melling, 1980:192).

In coalmining, the problems (and expense) of intensive management supervision were increased by the physical conditions of underground working; the great variety of circumstances under which the coal had to be got; and worker resistance to oppressive surveillance by underground officials at the coalface. In these conditions, piecework had obvious attractions for mineowners and managers.

> .....such supervision as is possible and is generally practised in surface employments is impracticable. The piece rate may not be a perfect method of wage remuneration; but while it automatically punishes the lazy and indifferent workman, it at the same time automatically rewards the capable and industrious workman. (Evans, 1911:219)

The problem for mineowners in the early-to-mid nineteenth century, however, was to create the 'industrious workman' in the first instance; that is, to habituate labour to a capitalist work regime demanding regular hours of work and regular attendance. The piece-rate system did not obviate employer labour-management problems, and was alone insufficient to secure and retain a supply of workers 'possessing habits of regularity' (Church et al, 1986:259). In attempts to meet their labour requirements, 'many coalowners sought to modify customs and contracts and to impose greater control and regulation of workers', and in this process 'law and government, as well as the labour policies of colliery managers, played their part' (Ibid).

Contracts of Employment and Work Discipline

Up until the mid-nineteenth century in Northumberland and Durham, hewers and putters were hired under the terms and conditions of 'the bond'. Setting out in detail the work to be done, rates of payments, penalties for transgressions relating, for example, to the quality of coal got, absence from work, and other 'unacceptable' behaviour, the bond was renewed annually and was enforceable by law (Griffin, 1978; Church et al, 1986:260-1). For mining employers, the bond represented a means of recruiting and retaining for a period of a year the 'best', most disciplined or regular workmen. Recruitment in the first instance was therefore often dependent upon the personal recommendation of a former employer, or current employee, although competition between employers for such workers could (according to the state of trade) force up the 'binding money' (paid in cash or beer), and the time of the annual hirings was frequently the occasion for strikes over the terms and conditions of employment (see also Sweezy, 1938). Breaches of the bond constituted a civil and criminal offence, and hence the practice of binding was also a means of maintaining discipline. Absconding miners could be imprisoned or fined, and fines could be imposed for absenteeism, or other failures to comply with the mineowner's stated terms and conditions.

Binding in the North East was closely related to the northern mineowners' organized 'limitation of the vend', or attempts to regulate competition and restrict output and in this way maintain selling prices. Up until the early nineteenth century, the northern coalmasters dominated the sea-borne trade of coal to London - then representing the principal market for a coal trade largely oriented towards domestic, or household consumption. Attempts to regulate output and prices had only ever had a measure of success for short

periods of time and, from the 1840s, the 'limitation of the vend' collapsed. The extension of rail transport facilitated the development of other coalfields and evoked an era of intensifying inter-district competition over domestic and industrial markets (Sweezy, 1938). The periodic over-supply of coal and intense competition for markets in turn made the northern mineowners anxious to secure cost flexibility, which in this labour-intensive industry meant wage flexibility, and certain elements of the bond became increasingly irksome to them; in particular, the minimum wage and regular employment guarantees that had formerly been attached to annual hirings. Since these guarantees were about the only aspects of the bond favourable to mineworkers, the owners' determination to rescind them provoked a series of stoppages at annual hirings, culminating in a seventeen week strike in 1844. This ended with the miners returning to work on the employers' terms which included the substitution of monthly for annual contracts, the abolition of minimum wage and employment guarantees, but the retention of the various disciplinary elements of the bond which could still be enforced at law (Church et al, 1986:261).

The traditional view of the bond, as a system which rendered the northern miners 'only a degree less unfree' than the Scottish miner serfs of the eighteenth century (Pollard, 1978:136), perhaps misses some of the contradictions of its operation. Elements of the bond could operate to the miners' advantage, and it was the loss of the minimum wage and employment guarantees - a burden to employers in the epoch of competitive market capitalism - that lay behind the northern miners' attempts to secure the reintroduction of binding in the 1840s and 1850s. Failing this, the miners attempted to protect earnings and employment through other means, and a principal platform of the 'national' miners' unions of the 1860s became the

regulation of output (see Harrison ed, 1978). Divided by competition, employers were in no position to entertain such schemes. On the other hand, competition for labour in the context of rising coal prices prompted mineowners in the North East to attempt to reintroduce annual hirings in the early 1860s. Buoyed by the conditions of the coal trade, however, the miners' organizations were sufficiently strong to resist the reimposition of the bond, now unambiguously regarded by the mineworkers as a system of slavery (Church et al, 1986:678).

The use of the law, and paralegal structures of punishment, to enforce discipline was not confined to the North East. Prosecution for the breach of a bond 'had its more widely applicable counterpart in the Master and Servant Act of 1823, which made it a criminal offence for a worker to break his contract (by verbal or written agreement) and was punishable by fine, or a maximum period of three months' imprisonment with hard labour' (Ibid: 261). The use of this law, or threat of prosecution, was not uncommon in the coal industry of the mid-nineteenth century, although employers in some districts relied upon it more heavily than others. Another crude method of retaining labour was the long pay, which forced workers into indebtedness at company owned or controlled stores. The discharge note also offered employers a means of restricting labour mobility, and enforcing discipline in production. Effective use of the discharge note, however, required a level of cooperation between employers that was not always easy to sustain, especially at times of peak demand for coal and, with this, for labour (Morris and Williams, 1958:286).

The decline in the use of long pays, payment in truck, and of corporal punishment to maintain discipline in production (often associated with the big butty system, but by no means confined to it) from the mid-nineteenth

century is often attributed to the passage of mining safety legislation (for example, Taylor, 1960; Griffin, 1978). Women and very young children were excluded from underground employment by the Mines Act of 1842, and this no doubt reduced the scope for the exercise of crude physical discipline in production, whilst also to an extent curtailing the conditions in which the big butty system had thrived (see chapter 4). Legislation in 1850 established the Mines Inspectorate, and empowered the inspectors to conduct underground inspections of mines. Drawn from the ranks of the 'viewers' (professional mining engineers), the inspectors were highly critical of many employer labour-management practices. These were often criticized for failing to promote discipline and efficiency in labour utilization, rather than simply for their consequences in terms of the miners' health and safety, although of course the two elements were closely related. But since there were only 4 inspectors in 1850 (and only 12, covering the whole industry in 1855), it is doubtful whether their limited powers of surveillance constituted a major force for change. More powerful, perhaps, was the surge in the demand for labour from the early 1860s which limited the efficacy of earlier methods of retaining and disciplining underground workers.

The insertion of rules and regulations in workers' contracts, and use of fines and penalties to maintain discipline, did not die out from the mid-nineteenth century, however, and indeed such practices were to an extent encouraged by the passage of safety legislation. The Mines Inspection Act of 1855 introduced 7 General Rules governing coal (and metalliferous) mines. Mineowners found to be in breach of the safety regulations were liable to be fined; workers were liable to be prosecuted and/or fined. The Act required all collieries to adopt by-laws in accordance with the general

safety code, and also a set of Special Rules tailored to meet local conditions. The Special Rules were drawn up by mineowners, and some employers took advantage of this opportunity to impose stringent regulations relating to hours of work, attendance, the quality and quantity of coal got out (Arnot, 1953; and see also chapter 6 below).

The piecework payment system gave rise to what Marx described as 'frauds committed by the capitalists' (1976:694). In the coal industry, the collier's output was weighed at the pit bank and employers might refuse to pay the correct wage on the grounds that tubs were under-weight or filled with 'dirty' coal, containing too much stone or rubble.

> Occassionally your tub was tipped up on the pit top and examined for dirt. It had to be coal in those days that you filled. If the dirt was over a percentage you'd be called out of the mine.....You'd have to come out, with no pay for it. That was the punishment, and that amount of dirt could be deducted from whatever you filled in other boxes.
>
> (Miner from Parr, born in 1893, cited in Forman, 1979:41)

Up until the 1860s, colliers had no formal role in the process of weighing the coal at the surface, and there are various accounts of employers defrauding their workmen by adding dirt to filled tubs, under-weighing tubs, or changing the basis of measurement (see, for example, Hammond and Hammond, 1919). It is hardly surprising, therefore, that the institution of the checkweighman system formed a priority for the early miners' unions. With the Act of 1860, colliers won the right to elect their own representative to check the weighing of coal, and the checkweighman system formed the basis for more permanent labour organization at pit level. Initially, however, checkweighers were liable to be victimized by

management, while employers devised various means for evading the provisions of the 1860 Act (Arnot, 1949: 46,50).

Company Housing

A discussion of the terms and conditions attached to employment contracts is incomplete without some consideration of welfarism in the coal industry and, more specifically, employer provision of accommodation for workers. In the North East, and to a lesser extent in Scotland, colliery housing formed part of the hewer's contract or annual bond. 'Rent-free' accommodation remained part of the northern hewer's remuneration package throughout the nineteenth century. Elsewhere, and especially in more geographically remote mining districts, employers (or, sometimes, landowners) were forced to provide accommodation for workers in order to meet their labour supply requirements. Outside, the North East, however, the rent more often than not was paid out of the collier's weekly or fortnightly earnings.

Considerations of labour supply formed the principal motive for house building, most especially in rapidly developing mining districts which were remote from urban centres. While the provision of accommodation added to the initial fixed capital outlay incurred by the mining company, mineowners were generally persuaded of the benefits where the alternative would have involved employees walking long distances to work. Long-distance commuting was viewed by mining employers as the route to high levels of absenteeism at the pits.

> It is felt to be an advantage from the employers' point of view that they can count more steadily on the work of men who live in the colliery houses, especially where the pits are removed from centres of population.
> (Royal Commission on Housing in Scotland, Report, 1917-8:148)

The provision of colliery housing has also been interpreted as an employer policy designed to attract a 'good staff of men', or 'core' labour force of well-disciplined operatives (Church et al, 1986: 279; Melling, 1981). In this way, hierarchical employment structures and divisions between grades may have been nurtured and reinforced, since colliery housing (or the best of the company's housing stock) might be reserved for principal operatives - hewers and/or underground supervisory grades. But established practices could become a constraint on employers, restricting their ability to respond to new circumstances and developments. The example of the North East has already been mentioned. Employers tried to substitute putter-hewers for hewers at the face, but the former demanded the latter's privilege of 'rent-free' accommodation before they would comply and the dispute served (to an extent) to unite the interests of the two groups of faceworkers.

Company-owned housing also offered employers a weapon that could be used against recalcitrant employees. Mineowners could threaten to evict striking miners, or individual mineworkers who failed to comply with the company's rules and regulations in production. Equally, the threat of eviction could be used to inhibit the growth of union organization and to victimize individual activists. There are numerous examples, especially in the period before the 1880s, of mineowners using their position as landlords to coerce striking miners back to work, or to penalize workers for 'poor' performance and insubordination. The scope for mass evictions, however, as Church et al suggest (1986:280), was probably more limited in some coalfields by the late nineteenth century. Alternative forms of housing provision developed with the expansion of centres of mining, while crude coercion ran the risk of simply escalating conflicts with the growth of more permanent trade

unions. The use of the sanction of eviction, moreover, was likely to produce further problems of labour-management for employers, and to conflict with their attempts to nurture a 'good staff' of willing and cooperative workmen.

While company housing probably peaked before the 1870s, as late as 1925 colliery companies owned between a quarter and a third of the housing in the principal mining communities (Samuel, 1926, Report, Vol.1: 200). There were quite marked regional (and intra-regional) variations, however, in the extent of company-owned housing, the conditions of the housing stock, and the terms under which the accommodation was let. In the mid-1920s, about 40 per cent of all colliery owned housing was in the North East, where some of it was still provided 'rent free' (that is, as part and parcel of the miner's wage). Across the coafields, much of the company-owned housing had been built in the nineteenth century, and in some districts - notably Durham and also mining regions in Scotland - much of the housing (which was often inadequate in the first instance) had deteriorated beyond the point of squalor for the want of any subsequent maintenance. In the East Midlands and South Yorkshire, on the other hand, which were two of the most rapidly expanding districts in the late nineteenth and early twentieth centuries, some firms had constructed 'model villages' and, according to the official enquiries of the 1920s, made 'model' accommodation - 'equal to any in Great Britain' - available to their employees (Ibid:199).

Company housing formed an important element in employer attempts to secure their labour requirements in the nineteenth century. In the East Midlands and South Yorkshire, large joint stock companies continued to invest in the provision of worker accommodation and into the twentieth

century provided (or organized the provision of) amenities such as schools, churches, shops, sports grounds and clubs. More generally, however, employer involvement in house building and welfare provision was on the decline from the late nineteenth century. Church et al attribute this in part to the growth of trade unionism which 'helped to impose constraints upon the effectiveness of a policy of housing provision as one form of labour regulation' (1986:281). They suggest that employers increasingly turned from private initiatives to combined action in their efforts to limit the growing strength of trade unions. But other factors were operating to make employers reluctant to provide - or maintain - worker accommodation, while miners' housing was in turn becoming a major source of industrial unrest in some areas as is suggested by the appointment of the Royal Commission in Scotland of 1911-17.

The Commissioners condemned the deplorable state of much company-owned housing in Scottish mining districts, noting that the poor physical quality of the accommodation was often compounded by severe overcrowding. They identified the private ownership of coal royalties as one of the factors 'inducing the (mine) owners to provide houses of inadequate structure' (Report, 1917-8: 127, 150). The location of mines, layout of underground and surface works - including workers' housing - were influenced by the terms and conditions of the mineral lease negotiated between the landowner and mineowner (see chapter 2). While this in itself might mean that houses were constructed on unsuitable and overcrowed sites, the mineowner's incentive to improve the accommodation would be diminished since the investment could be appropriated by the landowner at the termination of the lease.

Certainly poor quality housing was not specific to the Scottish coalfields. Critical of many aspects of the coal industry, which seemed unable to restructure and modernize in the face of intensifying international competition, the Coal Industry Commission of 1919, chaired by Sir John Sankey, also roundly condemned the state of colliery housing in a number of British coalfields as 'a reproach to our civilisation' (Interim Report, 1919:7). Thus, the mineowners were increasingly criticized for their failure to provide adequate welfare facilities and evidence of the deplorable living conditions of many mining families was an influence on Sir John Sankey's decision to support the miners' demand for the nationalization of the mines in 1919. But the Government rejected nationalization, after the threat of a national strike had passed, and proposed an alternative package in an attempt to appease the miners whilst maintaining the system of private ownership. This included the subsidised improvement of colliery dwellings and creation of a Miners' Welfare Fund to be financed by a levy on coal output and applied to 'purposes connected with the social well-being, recreation and conditions of living' of coalminers.

DIRECTION AND DELEGATION IN THE LABOUR PROCESS

Hand coal-getting remained the predominant method of coal extraction in the British coalmining industry in the period before the First World War. At the coalface, the collier (or work group) performed the complete operation of winning the coal which comprised the different processes of undercutting, ripping and filling. Colliers retained immediate control over

the pace of work. Skilled workers, they required little instruction as to how best to win the coal, and the coalface deputy - the front-line supervisor - had little role to play in coordinating the different operations involved in coal-getting. Close supervision of the collier's work was difficult for employers to impose - because of the nature of the work, the physical conditions under which it was performed, and because faceworkers resented interference and imposed various controls to limit the deputy's ability to intervene. The piece-rate system provided employers with an indirect control on the intensity of work effort, or a means to circumvent both the difficulties and expense of close supervision at the face. The insertion of rules and penalties in employment contracts represented early - and somewhat crude - employer attempts to influence the regularity of attendance and quality of the coal got out, and such practices were actually retained well beyond the early nineteenth century.

Colliers had an autonomy in their work which other grades of underground labour might not possess. Within the coal-getting class, however, there were variations across the coalfields (and over time) in terms of the degree of control exercised over work and working conditions, while the potential for friction between the pit officials and faceworkers also varied. The experiences of other grades of underground labour were also different. Skilled specialist grades such as timbermen and stonemen, were next in line to the colliers in terms of the degree of direct managerial supervision to which they were subject. In the different coalfields, these grades were sometimes paid piece- and sometimes day-rates. In either case, however, they would generally have a well defined 'stint' of work to complete in their shift; a certain yardage of roadway to timber or to

drive. Their contact with the underground officials would generally be limited to the process of measuring-up the work performed, and bargaining over any 'excess' (or under) payment.

Haulage workers were in a different position. They faced much greater discipline, both from the colliers whose own payment depended on the number of tubs filled and raised to the surface, and from the underground pit officials who would be anxious to ensure that the colliers were properly 'serviced' with a steady flow of tubs to and from the face (see Goldthorpe, 1959). But the relationship between the colliers and haulage workers could vary with, for example, economic conditions. Thus, Manley describes how in South Yorkshire when wages were low, and when colliers were anxious to fill as much coal as possible to make up their earnings, they might be forced to 'bribe poney drivers to "slip 'em a couple (of tubs) in" out of turn', with tobacco being the usual medium of payment (1947).

In Durham, putters on face haulage were paid a piece-rate, or according to the 'number of full tubs they "put"', with a price per score of tubs fixed for so many yards of 'putting'. This meant that the distance between the putter's 'flat' to their working place at the face had to be constantly measured to avoid disputes over payment (Bulman and Redmayne, 1951:100). In South Wales, haulage workers were on day-rates, as in many other districts. The distinction is significant insofar as workers on piece-rates had a greater opportunity to make up their earnings when wage-rates were low by intensifying their work-load (often at the expense of their own safety) than daywage workers. The latter would also be forced to work harder, in order to keep pieceworkers at the face supplied with tubs, although without the compensation of at least maintaining their income.

Method of Extraction

While hand coal-getting remained the predominant method of winning the coal in the period before the First World War, different systems of laying out the mine and working the coal - or of coal extraction - were employed in the different coalfields. These divide into two principal types - bord and pillar and longwall mining - although numerous modifications and hybrid versions of these methods were practiced, and different systems were often employed within a single mine (for a detailed account, see Bulman and Redmayne, 1951). Bord and pillar was the older of the two methods and in 1830 the bulk of British coal output was won under one or other version of this particular system. But longwall mining was extended from this period, with the pace of the transition to the longwall system accelerating in the years after 1860 (Church et al, 1986:336). The extension of longwall mining through the different coalfields over the nineteenth and early twentieth centuries has been interpreted in some accounts as an employer assault on the autonomy of the coal-getters, facilitating a greater degree of direct managerial supervision at the face (see, for example, Wellisz, 1953). This argument may be considered in greater detail.

Originally employed in the northern coalfields of Northumberland and Durham, the defining characteristic of bord and pillar mining was that only part of the coal was removed in the initial operation. A series of parallel roads were driven into the coal and connected at intervals by roads driven at right angles. This part of the operation was known as 'working the whole', as the roads were driven to the boundary of the colliery area. Later, the isolated pillars that had been left to support the roof were cut away, which was known as 'working the broken'. A variant of bord and pillar working which retained the distinction of the two separate extractions was

the 'pillar and stall' method. Here, the second working followed immediately on the first. A 'stall' or working place - generally for one or two hewers - was driven off the heading, and when this was completed the pillar was worked back towards the starting place (see figures 3.1 and 3.2 below, from Daunton, 1981: 581).

Figure 3.1 Bord and Pillar

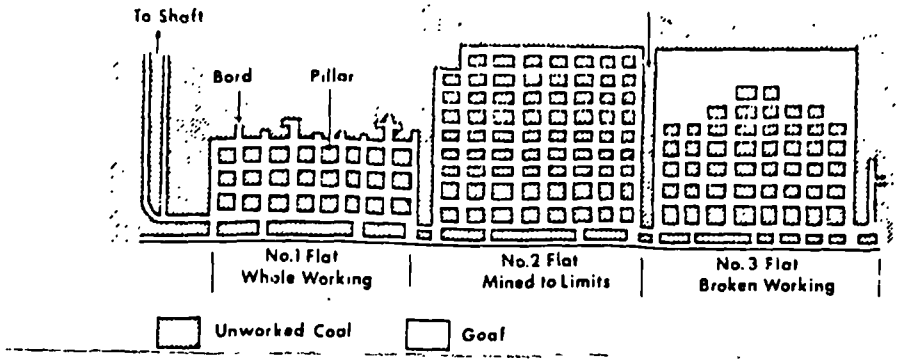
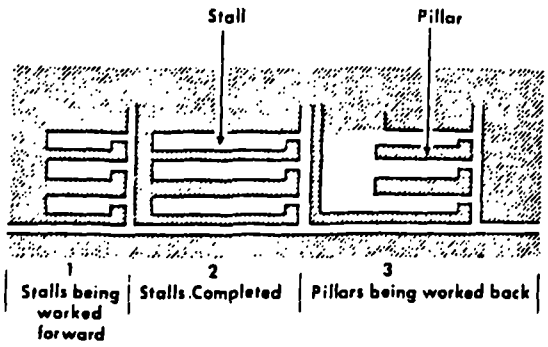


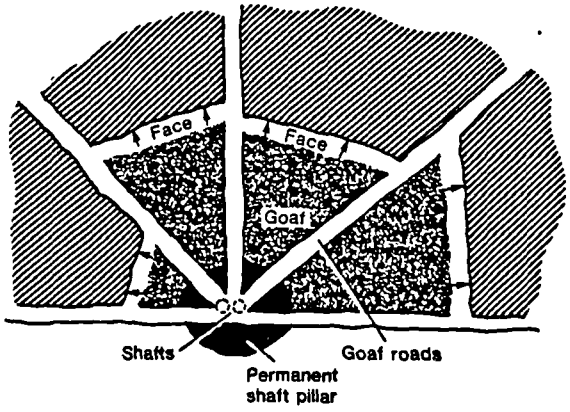
Figure 3.2 Pillar and Stall



Longwall working was radically different in that the whole of the face was worked simultaneously; either outwards from the pit bottom, known as 'longwall advancing', or backwards from the boundary, known as 'longwall retreating'. Although the whole of the face was worked, it was divided into sections or stalls either side of the roadways. The length of these stalls varied in different districts, as did the number of workers employed in a

single stall, but they usually formed a more or less self-contained unit. This was the working place of the collier or coalface work group.

Figure 3.3 Longwall Advancing



(Source: Church et al, 1986: 339)

Longwall mining originated in Shropshire in the seventeenth century, and was adopted thereafter in other mining districts in the Midlands. Ashton and Sykes (1929) noted the different methods of coal extraction in the North East and in the Midlands, and the different systems of work organization employed in the eighteenth century. In the former, colliers were 'bound' under individual contracts to a particular employer for a period of a year. In the Midlands, where the stalls under longwall mining were much larger than the stalls of bord and pillar working in the North East, employers hired labour under a gang system, or collective contract. Ashton and Sykes concluded that these different employment and work arrangements were a function of different methods of coal extraction, with the latter in turn determined by geological conditions.

> For it is obvious that in the narrow bords or stalls of the northern coalfields the individual must usually work alone - or at the best be assisted by a single marrow - whereas a considerable degree of cooperation and division of labour is required by the Shropshire method of longwall

> working. The collective contract and the individual bond thus reflect peculiarities of technique which are themselves ultimately determined by geological conditions. (1929:111-112)

In a similar vein, other commentators have identified in the transition to longwall mining over the nineteenth century an assault on the craft status and autonomy of the coal-getter. Thus, the introduction of longwall mining has been held to have facilitated a greater concentration of labour along a continous length of face, a greater sub-division of labour or fragmentation of the collier's complete task, and consequently the closer surveillance and direction of faceworkers by underground officials (eg Wellisz, 1953).

Certainly Bulman and Redmayne - professional mining engineers of the late nineteenth and early twentieth centuries - favoured such a reorganization of work with the introduction of longwall mining. They pointed out that in the North East, with bord and pillar working, the hewer performed the complete operation of cutting, ripping and filling, and worked alone in a single stall which he shared with his 'marra' who worked on the second, or back shift. They went on to argue that:

> This system is probably not the best adapted to longwall working, to get the full benefits of which it is sometimes important that the face should be carried forward as regularly as possible, and that kirving should be continuous along a good length of face, before coal is allowed to fall. Recognising this truth, some managers have adopted the division of labour which is common in Derbyshire and elsewhere - namely, that of holers, getters and fillers - thus dividing the hewers' work into three classes of labour. (1951:227)

Bulman and Redmayne were forced to conclude, however, that in the late nineteenth century where longwall mining was employed, a variety of work

arrangements were adopted: one man working alone and responsible for all the work in a certain length of face; three or four men in a stall sharing the work and their earnings equally; three or four men working together and each specializing in a particular task.

TABLE 3.1. METHOD OF COAL EXTRACTION, GREAT BRITAIN, circa 1905

Somerset	Longwall
Warwickshire	Longwall
South Derbyshire	Longwall
Yorkshire and Lancashire	Mostly Longwall
Cumberland	Mixture: seams under 4 ft - longwall seams over 4 ft - bord and pillar
Scotland	Mixture
Central coalfields	Stoop and room and Longwall
Eastern coalfields	Pillar and Stall
South Wales	Mixture
Western/Anthracite	Longwall
Steam coalfield	Mixture, with pillar and stall dominant
South Staffordshire	Mixture, pillar and stall in 'solid' coal seam
Northumberland & Durham	Bord and Pillar and Longwall, the latter especially in thin seams

(Digest of Evidence Given Before the Royal Commission on Coal Supplies (1901-05) Vol 1: 192-220, reprinted by *Colliery Guardian*, 1905)

Church et al (1986:337) estimate that three-quarters of UK output was got from longwall faces advancing from the shaft by 1900, with bord and pillar working retained to any extent only in the North East, Cumberland, North

Wales, South Staffordshire and certain thick coal seams elsewhere. Other commentators, however, whilst acknowledging the steady transition to longwall mining over the late nineteenth century, have suggested that it accounted for no more than 50 to 60 per cent of aggregate British coal output in 1913 (eg Supple, 1987:27-9). Evidence presented to the Royal Commission on Coal Supplies (1901-05) suggests that the position at the beginning of the twentieth century was as depicted above in table 3.1.

Evidently, geological conditions partly explain the transition to the longwall system. With bord and pillar working, headings were driven in solid coal, but they also had to act as haulage routes. Hence, with the working of thinner seams at a greater depth from the surface over the late nineteenth century, much stonework and ripping was required to ensure that the roads were of sufficient height to allow trams or tubs to pass. This meant more 'deadwork' and rising costs, with a smaller proportion of the underground workforce actually engaged on coal-getting.

The longwall method might offset rising 'oncost' expenditure, and raise the overall productivity of the underground workforce, by reducing the amount of road-building necessary. In similar geological conditions, longwall mining would normally yield the largest extraction of coal from a given area and a higher percentage of 'round' or 'large' coal which, for some types of coal and markets, commanded a higher sales price. The weight of coal above the face might assist the process of coal-getting, insofar as it reduced the amount of drilling necessary. But the danger of subsidence would also be increased and it was necessary to pack the 'goaf' - or space left behind the advancing face - and employ improved techniques of roof control. It was the method of longwall advancing that was employed in the British coal industry, and with this technique the tramroads to the face

could be kept short, while profitable coal-getting could begin with the minimum of delay after capital had been committed to the opening-up of a pit. Nevertheless, the tramroads to the face had to be constructed in the goaf and this work, together with the excavation of material for packing, could absorb a considerable amount of 'indirect' or 'oncost' labour.

Longwall mining gradually displaced the bord and pillar method as the dominant method of extraction in the British coal industry, and many commentators in the interwar period of the twentieth century considered it to be a prerequisite for the introduction of machinery at the face (see chapter 5). Prior to the introduction of mechanical cutters and conveyors, however, various factors might combine to favour the retention of the bord and pillar method. Some witnesses were inclined to emphasize labour relations. One contributor to the *Colliery Guardian*, for example, argued that the efforts of the hewers to 'maintain under the new conditions the rights, customs and traditions which had grown up under the old conditions, but which were singularly inapplicable to the new ones' had impeded the transition to longwall mining in the North East (Vol. CXXIX, 5.6.1925:1381). But geological conditions and improvements to the bord and pillar technique had favoured the retention of that method at many pits in the northern coalfield. In any event, it is evident that in many other mining districts, the persistence of 'old' working practices did not inhibit the transition to the longwall method.

Available evidence suggests that where the coal continued to be undercut by hand, the introduction of longwall mining left the collier's work essentially unchanged. Rowe (1923:60-1), for example, noted that exactly the same work arrangements prevailed under both longwall mining and bord and pillar working in Cumberland in the early 1920s.

> The "Main Band" seam is worked almost exclusively by the bord and pillar method, but it is gradually becoming exhausted. The other seams are mainly worked longwall, and hence the last thirty years has seen a relative increase in this latter method. But the existing system of longwall working still bears many of the signs of the older method. The stalls are, as a rule, opened out 6 yards either side of the gateway, and there are only two men to a stall. In the bord and pillar working there are two men to a place, and they share equally and do all the work in the place... ..... Exactly the same conditions prevail in longwall working.

Similarly, in Lanarkshire (Campbell and Reid, 1978) and in South Wales (Daunton, 1981), the introduction of longwall mining did not institute a new division of labour at the coalface, or radically transform existing arrangements - which differed in various respects in each of these coalfields.

In the Midlands, arrangements were again distinctive. Throughout the nineteenth century, longwall mining had been the method of working in the Midlands coalfields and the stalls were much larger than in most other coalfields adopting this technique. In Cannock Chase, Nottinghamshire and Leicestershire, six to eight men would be employed in a 'place' and there would be some specialization of task between the members of the work group. Thus, in Cannock Chase, where the imprint of the butty system remained in the early twentieth century, the stalls were let to two stallmen or 'contracting colliers', who contracted to get the coal and deliver it into tubs, set the timber, build stone packing, and lay the tram rails. They engaged holers and fillers on a day-wage basis, the former having a definite 'stint' - or length of face to undercut - before they could leave

the working place (Bulman and Redmayne, 1951). But, as Daunton has pointed out, while there might be some specialization *within* the work group as to who cut, ripped, and filled, there was no specialization *between* the work groups, and the pace of work was still 'largely set internally from within the group which was working on piece-rates' (1981:584; and see also chapter 4 below).

With hand coal-getting under either the bord and pillar or longwall method of extraction, the collier or coalface work group was responsible for the complete operation of winning the coal. The collier or, in the case of the butty system, the contracting colliers, retained control in determining how best to work the face and in which order to complete the various tasks involved. The really significant contrast, as Daunton suggests, was not between these two systems but rather between hand coal-getting and machine mining and, specifically, the 'unit' or partially-mechanized mining system introduced in the interwar period of the twentieth century. Under this system, which involved the use of machinery for undercutting the coal, the process of winning the coal was sub-divided. Cutting, ripping, and filling were performed by different sets of workers, working on three separate shifts in a twenty-four hour cycle of operations.

Wellisz (1953) suggests that the introduction of longwall mining was a source of heightened tension between faceworkers and management because the small, integrated unit of the stall was broken-up and the system entailed more intensive managerial supervision and a loss of autonomy for the worker. With pillar and stall working, close supervision of faceworkers was certainly difficult because they were dispersed in their separate stalls. But while colliers were brought together along a length of working face under the longwall method, they still worked in their own 'place' at the

face. They continued to determine how best to work the coal and, within the constraints of the piecework system, set their own pace of work. Commentators often suggest that the longwall method made supervision more necessary because the face had to be kept in a straight line and carried forward as regularly as possible. But this was perhaps more the case with longwall retreating - a method that was only rarely employed in the British industry. The layout of longwall faces advancing from the shaft actually varied enormously. Sometimes the working face was advanced in a stepped line; an arrangement which might fit in well with the determination of employers to minimize 'oncost' expenditure on supervision.

Longwall mining may have placed the coalface deputy in a better position to observe the men at work. But this alone was insufficient to enhance the deputy's ability to cajole or entice the colliers to work more intensively. Thus, in his description of mining in twentieth century County Durham, Dave Douglass argues that even where longwall working had been introduced, and whilst the deputy was always in or near the face, his powers of supervision were no greater than they had been under bord and pillar working. At this time, longwall teams in Durham worked under their elected leaders and would refuse to accept supervision or advice from the deputies (1977:218-220).

This is not to suggest that the introduction of longwall mining was unproblematical. In South Wales, for example, its extension in some parts of the coalfield from the 1860s was a source of conflict between colliers and management (see Vincent, 1900:186). Disputes centred on a number of issues including safety and the revision of cutting rates and allowances. Nevertheless, the significance of the transition to longwall mining - in terms of the nature of supervisor-worker relations - was incommensurable with the changes instigated by the introduction of machine mining in the

interwar period of this century. Under the 'unit' system of machine mining, the discrete stalls of the unmechanized longwall method were displaced and the coal was extracted along a continuous length of working face of a hundred yards or more. The collier's work was sub-divided between three separate shifts of cutting, ripping and filling performed consecutively in a twenty-four hour cycle of operations.

> No shift could begin until the previous one finished, so that the deputy now became vital in co-ordinating the operation as a whole. Instead of working in a separate place, responsible for all three processes in its own place, the miners were now limited to one stage of the work which treated the whole face as a single unit. The switch from pick-and-shovel to mechanized work thus meant an assault upon the craft status of the hewer, and the replacement of a vertical by a horizontal division of labour. (Daunton, 1981:584)

The unit, or cycle, system of machine mining and its consequences for supervisor-worker relationships are discussed in detail in chapters five and six of this thesis. It is as well to point out at this juncture, however, that the interwar period of the twentieth century also witnessed significant changes in supervisor-worker relations in unmechanized pits; in many instances, a managerial assault upon job controls instigated in conditions of failing profitability and facilitated by high and rising levels of unemployment in the coalfields.

'Deadwork' at the Face

Available evidence suggests that the transition to longwall mining over the nineteenth century did not radically transform the labour process of coal-getting or the nature of supervisor-worker relations at the coalface. Many

of the 'customs and traditions' established under an earlier method of coal extraction were carried forward under the new system. These customary practices, however, varied between (and often within) the coalfields and continued to form the site of struggles between mining employers and mineworkers. For example, in the organization of ancillary tasks - or 'deadwork' at the face - practices varied across the coalfields.

In his analysis of work organization in the British coalmining industry, Rowe (1923) identified the greatest contrast as between arrangements in the North East and in the Cumberland coalfield. The former displayed the most finely articulated employment hierarchy below ground in the mines; the latter, the least differentiated workforce. At the face in the North East:

> ....the hewers, as a general rule, get the coal down and fill it into tubs; brushing and ripping (i.e. taking up the roof or floor to make room for further operations) are done by another distinct grade, the timbering by another, the putting by another, and the continuation of the tram lines as the face recedes by yet another. (1923:57-8)

There were also distinct grades of labour for haulage, repair work on the roads and maintenance, so that in the North East 'all the other duties were performed by men who have specialized in that particular kind of work, and we may repeat once more that in no other coalfield were there anything like so many distinct grades of labour, even in 1914, and this would be even more true thirty years ago' (Rowe, 1923:60). In Cumberland, in contrast, the hewer worked with a learner to whom he paid a day-wage, and was responsible for all the work at the face - cutting and filling the coal and ancillary tasks. In this coalfield, there was no separate grade for hand-putting with hewers responsible also for this work. Similarly in South

Wales, the collier was responsible for all the work in his 'place' and all the repair work 'back to the parting' or gateway entrance to his stall.

One result of these variations in the structure of employment, as Daunton suggests, was that while the hewer in the North East and collier in South Wales (and, it might be added, hewer in Cumberland) were at the top of the social hierarchy in their villages, 'the pitman in the north-east was conscious of a more variegated pattern of income and privilege than his peer in South Wales' (1981:585). There were also implications for supervisor-worker relations at the face. In the North East, the hewer was paid simply for winning the coal. Deputies were responsible for the ancillary task of timbering at the face (Rowe, 1923:58) which emphasized their 'servicing' role in relation to the hewers. The Welsh collier, in contrast, spent around a third of his working day on tasks other than coal-getting - for example, stonework and timbering (Bulman and Redmayne, 1951) - and this 'deadwork' accounted for some 26 per cent of his earnings. Since the deputies had to measure-up this deadwork and haggle over the payment, there was a tension in the supervisor-worker relationship in South Wales which the arrangements in the northern coalfield did not generate in the same way (Daunton, 1981:585).

The Allocation of Working Places

A further dimension of the variegated patterns of work organization in the British coalfields lay in the allocation of working places. In most coalfields, employers insisted on their right to allocate labour to working places at the face, and this formed a useful means for differentiating colliers and penalizing those who were regarded as troublesome. The quality and conditions of the collier's working place had an immediate bearing on

his piecework earnings. While payment was generally made for work in an 'abnormal' or difficult working place, colliers had to bargain with management over 'consideration' payments - possibly on an individual basis - and over the definition of 'abnormal' working conditions.

For hewers in the North East, however, the 'cavilling system' meant that the possibility of drawing an unfavourable working place was equalized. In the northern mines, faceworkers drew lots each quarter to determine their working place in the mine, and since this system protected them from the discriminatory practices of mine managers and employers, it gave the northern hewers a greater sense of freedom in production. Nevertheless, the cavilling system came under periodic attack from mineowners, and the details of the system varied between different companies within the northern coalfield (see also Daunton, 1981). Employers complained that output was lost each quarter, when the cavilling took place and the hewers settled their new working places in the mine (*Colliery Guardian*, 13.10.1922: 912). Employers attempted to limit the size of the area 'cavilled' to a single seam, or single pit, while hewers sought to broaden it as far as possible and to include all pits owned by a single company within the particular cavilling system.

While in most other coalfields managements reserved the right to allocate labour to working places, hewers in the Whitehaven pits in Cumberland had also won the right to 'cavil' in the late nineteenth century (*Colliery Guardian*, 16.11.1923:1240). From the early 1920s, however, the owners of the Whitehaven pits sought to terminate the practice on the grounds that output was lost each quarter under the cavilling system. The Company at this time was attempting to introduce a wide range of new working practices. In addition to the abolition of cavilling these included the

introduction of a new shift system, more stringent penalties for the production of 'dirty' coal, and more stringent regulations relating to absenteeism with the Company declaring that it would dismiss men 'losing two days in any week'. The Company's attempts to impose these new conditions precipitated a three month strike in 1923, in which 'strong patrols of police' were brought in to break-up the demonstrations of striking miners (*Colliery Guardian*, 13.7.1923:91). The dispute was eventually 'settled' through arbitration, with the award of Sir Lowes Dickinson upholding the Company's right to 'work the pits by any system they decide'. While the cavilling system was to have been terminated at the end of 1924, however, the owners agreed after further negotiations that it could be retained on the condition that the men 'cavilled' only three times a year (instead of each quarter), and did so in holiday periods - to prevent any loss of time and output to the Company (*Colliery Guardian*, 19.12.1924:1568).

LABOUR ORGANIZATION, WAGE REGULATION AND THE EIGHT HOUR WORKING DAY

Trade unionism in the British coalmining industry before the 1860s came in 'waves that advance and recede' (Arnot, 1949:46). In the 1860s, district and county trade unions emerged in a number of coalfields, and in some instances represented more permanent associations. But organization at pit level was very uneven across the coalfields, the degree of centralized authority conceded to the district union varied markedly, and a number of the district associations that came into existence in the 1860s were severely weakened or virtually disappeared in the Great Depression of the

1870s. Thus, in the period to the late nineteenth century, district and county trade unions continued to lead a precarious existence which depended in part on the distributional struggles of the industry's trade cycle (Fine et al, 1982).

Throughout the nineteenth century, the growth of coal output was marked by cyclical movements around an expansionary trend, reflecting in part the level of activity in the wider economy. In periods of strong demand, coal prices moved upwards and this encouraged the expansion of capacity and entrance of new producers. Competition for labour tended to force wages upwards, and it was in such periods that trade unions gained strength in the struggle to maintain an upward pressure on wage rates. Employers would generally respond, coming together in attempts to regulate competition for labour and resist the men's efforts to secure wage increases and other improvements in terms and conditions. It should be emphasized, however, that, as alliances, district employer associations in many instances were unstable in the period before the 1860s, with divisions of interest prohibiting more than a short-lived association or one with limited and specific objectives. The oversupply of coal, intensifying inter-district competition over markets, and downward pressure on selling prices would typically evoke the most coherent coordinated response from mineowners in a particular locality or district; at least insofar as they were brought together in their efforts to suppress resistance to wage reductions. Profitability was highly dependent upon the relationship between wages and selling prices because coalmining remained a labour-intensive process, and wages formed up to 75 per cent of the industry's working costs.

During the 'coal famine' of the 1860s there was a temporary upsurge in union membership across the coalfields. District and county trade unions emerged as more permanent associations in some instances, and the Miners' National Association was formed in 1863 (renamed the Miners' National Union in 1875). This was a loose federation which possibly maintained its continuity (into the 1890s) because it pursued fairly limited objectives, mainly campaigning for legislative reform particularly in the areas of health and safety. Negotiations over wages increasingly took place at a district level and from the beginning of the 1870s, formal boards of conciliation and arbitration were established in a number of coalfields. Porter (1970) argues that these developments occurred because the district and county unions concerned possessed insufficient strength to pursue a more militant policy but enough to persuade the employers that conciliation was needed. In practice, selling prices continued to be taken as the principal factor determining wage movements, and the balance of forces was such that arbitration awards consistently imposed wage reductions, even before the fall in coal prices in the 'great depression' which set in from 1873.

From the mid-1870s, there was an institutional move towards selling-price sliding scale wage agreements. Formally tying wages to movements in selling prices, sliding scales ostensibly made adjustments automatic. A base year for selling prices and wage rates (or standard) was chosen, and thereafter changes in wage rates were calculated by reference to 'a given percentage change for each change in selling price' (Porter, 1970: 466). But the sliding scale system of wage regulation was never truly automatic. Conflicts centred on the choice of base year and the rate at which wages should vary with prices, and in practice a particular scale rarely lasted

for more than two years (Church et al, 1986:700). The concept of the standard rate must also be explained.

Under the sliding scale system, and also under the conciliation board agreements introduced in the various districts from the late 1880s, percentage wage increases and decreases were made to standard rates. But this does not mean that there was a standard wage for different grades which applied throughout a district, and to which percentage additions or reductions were made. In most districts, the standard simply meant the piecework price lists and the actual rates paid to day-wage workers at each pit in the district at a given date, and was a 'most indefinite conception' (Rowe, 1923:42). As has been seen, piecework price lists and daywage rates were determined locally, at the level of the individual pit (or working face within the mine), through a process of bargaining involving the management and men. Either side might attempt to revise price lists as geological and other conditions changed, and new lists were established for new seams. Standard or basis wages were therefore not constant over time, since the alteration of price lists could alter the collier's earnings, as indeed could changes in geological conditions or in the state of the trade (with, for example, short-time working) independently from any change in piecework price lists. In other words, 'not only are the district percentage additions variables, but the basis rates to which they are applied may be variables also' (Ibid:50).

The situation in the counties of Northumberland and Durham was slightly different. In each county, Joint Committees comprising equal numbers of representatives from the employer and union side had been established in the early 1870s, and these Committees were authorized to settle all questions affecting individual collieries (but not county-wide disputes).

The 'County Average System' had been instituted under the Joint Committees; intially in Durham in 1872, and revised in both counties in 1879. Definite base rates for various types of work were established. General advances or reductions were made in the usual way on this sum. But price lists for hewing at the face, for example, in principle could not be altered unless it could be shown by the employer or the men that the average earnings per shift yielded by a particular list were either 5 per cent above or 5 per cent below the County Average. In theory, this established a minimum base rate, affording the northern hewers some protection from the adverse effects of working in a difficult 'place', and from management attempts to reduce earnings by a direct attack on piece rates. In practice, however, individual employers would resort 'to every device by which in the past they had evaded the general agreements', so that at times of intense price competition in coal markets they would urge workers at their pits that 'a local reduction could alone avert inevitable unemployment' (Welbourne, 1923:234).

Joint committees along the northern model were relatively rare in the coal industry before the 1890s. Welbourne suggested that it was because the county unions in the North East were 'unrivalled' in their 'organization, stability and firm purpose' (1923:226) that they were able to secure employer recognition and a formal role in the regulation of industrial relations, and thereby advance the interests of their members. Burgess (1975:188), in contrast argues that joint committees were confined to districts where 'a class of miners' officials had emerged with sufficient power and prestige to control the malcontents' within the rank and file. From this perspective, the benefits of joint regulation accrued more or less exclusively to the mineowners who had 'little to lose and much to gain

from recognizing the miners' representatives and agreeing to bargain with them'.

Certainly in Durham the mineowners acknowledged the benefits of operating through the union and, as Daunton suggests, there was an ambiguous relation between the union and the men because the union was involved in maintaining joint agreements.

> Part of the role of the Durham Miners' Association, in return for recognition by the Durham Coal Owners' Association in the formalization of industrial relations which emerged in the early 1870s, was to discipline members into acceptance of joint agreements on wages and working practices. The potentiality for disputes over the application of piece rates or cavilling practices was great, and the northern owners welcomed formal procedures in which the union was the sole channel for grievances and the guarantor of acceptance decisions. As the Durham Coal Owners' Association remarked in 1873, it "has, in many cases, been indebted to the attention and energy of the Miners' Executive for the repression of unlawful and vindictive action taken advisedly by local members". The union might thus have an ambiguous relation with its members, precisely over the operation of working practices. (1981:596-7)

There were tensions between the union and rank and file in the North East, and this is actually brought out in Welbourne's account (although he refers to the 'indiscipline in the union' in the 1880s). But there were tensions within the rank and file - if the term is applied to workers rather than simply to union members - as, for example, between different grades. The hewers dominated the lodges, and in turn the county unions, in the northern coalfields in the 1870s and 1880s, and much of the 'unofficial' strike action in the 1880s reflected the grievances of the putter and putter-hewer grades. In any event, accounts which attempt to identify a uniform cleavage

across the industry - as, for example, between moderate union officials holding back a militant rank and file (Burgess, 1975; Fisher and Spaven, 1978) - perhaps misrepresent the complex divisions within the mining proletariat, arising from the variegated conditions of work, and the influence of these divisions on the character of mining trade unionism. Differences in working conditions and payment systems meant that the interests of mineworkers did not automatically coincide. By virtue of regional variations in work organization, miners attached different priorities to different issues and this, as will be seen, presented barriers to unity.

Selling price sliding scales were introduced in the 1870s, at a time when coal prices were falling. Mineowners recouped price reductions by insisting upon wage reductions, but since wages were settled on a district basis, this fuelled cut-throat price (and hence wage) competition between districts. Inter-district wage-cutting brought little relief to the coal trade, which remained extremely turbulent for much of the 1880s, and much misery to mining communities. Trade union membership declined from an estimated peak of 50 per cent of the workforce in the mid-to-late 1860s, to around 16 per cent in the 1870s and early 1880s - although with marked regional variations (Church et al, 1986:689).

In the central coalfields of the Midlands and Yorkshire - which were oriented towards inland or UK coal markets - district and county unions attempted to renew and develop their organization in the 1880s and efforts were made to coordinate activities. Initially, attempts were made to maintain prices through an organized restriction of output and, as this failed, the different unions extended (financial) support for strikes in pursuit of wage claims (see Arnot, 1949). Assisted by the upturn in trade,

the unions in the central coalfields secured a 40 per cent increase in wage rates over the period 1888-90, although as Williams (1972) points out, this did not mean that earnings were necessarily increased by 40 per cent. Buoyed by the initial success of the 'wages movement', the autonomous unions involved agreed to form the Miners' Federation of Great Britain (MFGB) in 1889. A loose-knit association, this included the county unions of Yorkshire, Nottinghamshire, Derbyshire, Lancashire, Staffordshire, Warwickshire, Leicestershire and North Wales. Conciliation boards had been established in each of these districts in 1888, for the purposes of wage regulation. These boards comprised equal numbers of employer and workmen's representatives and an independent chairman, and met to determine percentage additions or reductions to basis rates - with, in practice, wages continuing to be dominated by movements in selling prices.

In the years between 1890 and 1893, coal prices fell dramatically. Wage reductions were enforced in the North East, Scotland and South Wales, after some lengthy strikes. In these districts, sliding scales remained in force. Within the MFGB, there was a growing unity around the demand for a 'living wage', and insistence that selling prices could no longer dictate wage rates. Employers in the Federated area pressed for a 25 per cent reduction in wages consequent upon the fall in selling prices. The miners resisted, and there began the 'great lockout' of 1893. After six weeks, the disruption to industry prompted the Government to intervene and secure a settlement. The miners would return to work at the old wage rates until the beginning of February, 1894, when a Conciliation Board was to be established to determine wage rates for the whole of the Federated area.

Historians are divided in their opinion as to the significance of the struggle of 1893 and its outcome. Arnot (1949), the official historian of

the miners' union, argued that the lockout ended in victory for the miners. Through the unity in their new organization they had been able to realize their goals as regards wage levels. Acknowledging that the Federated districts succeeded in maintaining a nominal wage of 30 per cent above the 1888 level, whereas other coalfields experienced successive reductions, Williams (1972) nevertheless argues that the lockout ended in defeat because the MFGB failed to secure the demand for a minimum wage. Williams, and also Porter (1973), argue that the establishment of a Conciliation Board for the Federated Area was of no lasting benefit for the miners. The principle that wages must follow prices was reasserted, while the insertion of maximum and minimum levels between which nominal wages could fluctuate ensured that the miners shared in all the misfortunes of the industry without being able to reap the full advantage of periods of relative prosperity. A more militant campaign would have brought higher wage increases in the years after 1890s, but this was prohibited because the miners' leaders had committed themselves once again to conciliation and were thus 'obliged to defend the system' (1972:16).

But the MFGB was at an early stage in its development in the early 1890s. While a majority of the autonomous county unions had been brought together in the struggle to resist wage reductions, there were many divisions - between different areas and grades. The MFGB was still not a national union - Scotland and South Wales only affiliated after 1893 - while organization was only built-up from the 1890s, with face and non-face workers included in the same union in some instances for the first time. The MFGB became a more cohesive body, capable of sustaining a national strike, as miners found common issues around which they could unite. In the 1890s, however, the northern county unions remained outside the Miners' Federation and

opposed to its campaign for an eight hour working day for all underground workers. To understand their opposition it is necessary to return to the great diversity in the systems of work organization in the coal industry, and to the particular arrangements in the North East.

Shift Patterns and Working Hours

Shift work in the coal industry was not an innovation of the twentieth century, associated only with the use of mechanical coal-cutters and conveyors at the face. But shift working in the nineteenth century was qualitatively different from the three-shift cycle of operations associated with the unit, or cycle, system of machine mining. Unmechanized mines might put on two, or even three, coal-getting shifts. Mechanized mines in the 1920s and 1930s worked a three shift system, but coal was only wound to the surface on one of these shifts.

The mineowner's motive for introducing additional coal-getting shifts was to raise the utilization of the fixed capital sunk in the pits. Thus, in his evidence to the Royal Commission on Coal Supplies in 1905, the Inspector of Mines for the Yorkshire District argued that:

> I think in all new and large collieries that will be the system (ie double-shift working)..... because they are deep, and the capital expended is so great, probably like half a million to three-quarters of a million, that they must work the machinery to the full extent in order to get the output that would be necessary to pay a dividend on their capital.

But of course the depth and size of pits in the early twentieth century coal industry varied enormously, while an alteration of working methods did not follow automatically upon an increase in mine size, and across the British coalfields there were marked variations in shift patterns.

Evidence presented to the Departmental Committee on the eight hour working day suggested that in the early twentieth century the two-shift system was more or less universal in Northumberland and Durham and also common in South Lancashire, while in West Lancashire the single-shift system predominated. In the South Yorkshire coalfield, single shift working was the general rule, although many of the larger pits were moving to the double-shift system. The single shift system was universal in South Wales and predominated in Western Scotland, although some 12 per cent of the output of the Fifeshire coalfield came from pits working multiple shifts (First and Final Reports of the Eight Hour Day Committee, P.P. 1907).

Pits in the northern coalfield had worked two coal-getting shifts since the 1850s, when there had apparently been a reduction in the hewers' working hours (Church et al, 1986:252-3). Two sets of hewers were employed on the fore and back-shift respectively. Up until the legislation of 1872, which restricted the hours of underground employment for boys under 16 to 54 a week, the hewer's shift in the North East averaged around 8 hours 12 minutes 'bank-to-bank', or 7 hours and 15 minutes at the face (Daunton, 1981:587). After the legislation of 1872, which stimulated adjustments for other grades of underground workers, hewers in the North East worked a 7 hour shift bank-to-bank, with approximately 5½ hours spent on coal-getting at the face (Welbourne, 1923:243). In practice, therefore, the hewer's shift in the northern coalfield was under eight hours, and considerably shorter than their counterparts in many other districts. At the opposite extreme, colliers in South Wales worked a shift of 9 hours 45 minutes bank-to-bank after the 1872 legislation, and eight hours at the face (Daunton, 1981: 588; Walters, 1975).

In the northern coalfield, hewers on the fore-shift descended the shaft at 4 a.m. and worked until they were relieved by their 'marra' on the back-shift which descended at 10 a.m. The 'marra relationship', with two hewers partnered to work in the same place at the face but on the different shifts, was 'of central importance, for the men usually divided their earnings, and alternated between the fore- and back-shifts each week' (Daunton, 1981: 587). It was an arrangement considered by many mining engineers to be conducive to high output at the face, and by other commentators to be important for safety in double-shifted pits.

> The miner who knows that another - not his choice - will work his stall on the succeeding shift, will not always take pains to secure the place before leaving.....Where the heading and stall system is in vogue, pride of place is lost when double shift comes in, unless the stall holder is allowed by a set rule to choose the partner who is to cross him on the other shift.....Under such conditions there will be no scamping of safety duties and no unfair treatment of the working place. An ideal arrangement is the pooling of earnings of both shifts, so that there is no wrong doing on the part of either.
>
> (*Colliery Guardian*, 17.10.1924: 1003)

In the North East, the marra relationship was recognized in the cavilling rules, so that the marra group cavilled for a new place at the same time. If one member of the marra partnership left, for any reason, the remaining hewer had the right to choose his next partner (Daunton, 1981:587). Such a relationship obviously could not develop in single-shift mines. Where it did develop, however, it became difficult to alter, as in the case of the North East (see below), and at the Whitehaven collieries in Cumberland where one of the issues in the strike of 1923 was the management's decision to move to a three-shift system and insistence that all three groups of

hewers working in a place should 'throw in' (or share) their earnings (*Colliery Guardian*, 8.6.1923:1435).

Hewers on the back-shift in the North East were wound to the surface from 4 p.m. They were followed on the night shift by the shifters and stonemen; these grades forming some 14 per cent of the underground workforce and working an eight hour shift. Putters and haulage workers, however, who formed some 41 per cent of the workforce, worked a shift of around ten hours, descending the shaft two hours after the hewers on the fore-shift, and ascending immediately before the back-shift of hewers was wound-up. Haulage workers, in other words, worked one long shift to the hewers' two. In South Wales, in contrast, haulage workers worked the same long shift as the piecework colliers (Daunton, 1981).

Hewers and maintenance workers in the northern coalfield, who formed a majority within the underground workforce, had little to gain from the campaign for an eight hour day pursued by the MFGB from its formation in 1889. The hewers possibly had much to lose. For while haulage workers stood to benefit from a reduction in working hours, 'If they were given an eight hour day, said both owners and men, the continuance of the two-shift system would be impossible' (Welbourne, 1923: 244). Various ways to accommodate a reduction in the haulage workers' shift were considered in the North East over the late nineteenth century (Ibid; Daunton, 1981: 592-3). Pits might work one shift of eight hours; an option that the owners were bound to reject since this would reduce output and the use of the fixed capital invested, and one which did not favour the hewers since it would increase their working day. Pits might work two equal shifts of eight hours; but again the hewers' shift would be lengthened. Or pits might work three shifts of hewers descending in turn and 'waited on' by two shifts of boys.

The last option was the one actually adopted when the eight hours Act was passed and came into force in 1910. It was also the option favoured by the employers. Although the northern mineowners had been opposed to the eight hours legislation, changes were impelled by its introduction and the particular change secured promised to raise output and the utilization of fixed capital investments. But while the length of the hewers' shift remained unchanged, the introduction of an additional (evening) shift threatened disruption to the men's working, social and domestic life. As Daunton has pointed out, the cavilling system was threatened as indeed was the marra relationship - institutions which buttressed the hewers' autonomy in production.

None of the options mooted prior to the introduction of the eight hours Act had been satisfactory for the hewers; all implied some worsening of terms and conditions. The northern county unions had therefore stuck out in opposition to the MFGB's campaign for legislative change, and the Executive of the Miners' Federation declared in 1902 that 'we have learned by experience during these fifteen years that the eight hours will never be placed on the Statute Book of Great Britain while we have Durham and Northumberland opposing us' (cited in Arnot, 1949:331). Hewers in the North East were obviously open to the charge of putting their interests before those of the haulage workers who worked excessive hours. But haulage workers in the northern coalfield were likely to graduate at some point to coal-getting at the face, and the dilemma was between a reduction in hours for putters and boys and a deterioration in the terms and conditions attached to the occupation to which they would progress.

Elsewhere in the industry, mineworkers stood to gain from a reduction in the length of the working day, and most especially in Yorkshire, Lancashire

and Cheshire, and in South Wales, where the hours of colliers and other underground grades in the very early twentieth century were considerably longer than those of their counterparts in other areas (Church et al, 1986:257). The MFGB's campaign for an eight hour day here served as a unifying force, a focus around which labour could organize in spite of the diversity of working methods and underground work organization. The Eight Hours Bill was eventually passed in 1908, and the Act came into force in 1910. The principal barrier to the inclusion of the northern miners was dissolved, and the county unions of Northumberland and Durham joined the MFGB in 1907-8, giving it a membership of over 600,000 in 1910 (Church et al, 1986: 690). A more cohesive body, the Federation went on to campaign for a national minimum wage and a national wage structure in place of district level agreements and conciliation boards (which had displaced sliding scales in most districts by the end of the nineteenth century). At each turn, however, the miners encountered intense employer opposition.

Employer Organization and Responses to the Eight Hours Act

Many of the factors dividing mineworkers also applied to the mineowners. Divergent geological and market conditions, and different methods of working, differentiated the interests of mineowners and this had the most significant implications for the development of a common employer policy.

Efforts on the part of mineowners to combine, on a formal or informal basis, had a very long history, dating back for hundreds of years before the nineteenth century (Lee, 1924; Church et al., 1986). Early efforts at organization were in general purely local (although 'local' had a special meaning in the case of the North East, which largely dominated the principal, London market up until the mid-to-late eighteenth century), were

directed towards specific aims and objectives, such as the regulation of output and prices, and were often of short duration. Thus, the 'limitation of the vend' in the North East was practised intermittently, under various administrative or regulatory bodies, and eventually collapsed from the mid-nineteenth century as the industry's expansion and intensifying inter-district competition rendered local attempts to control selling prices futile. Thereafter, district mineowners' associations were formed where divisions could be overcome to advance common interests, and principally the shared interest in the minimization of wage costs. The emergence of more permanent and formally constituted district mineowners' associations generally paralleled the growth of district and county trade unions.

The owners' national association - the Mining Association of Great Britain (MAGB) - was originally formed in 1854, as a loose federation of district associations and individual mineowners. The national organization's activities were defined and circumscribed by its constituents, the district associations, which were 'fiercely jealous of their independence, in large part because their circumstances and therefore interests were often distinctive - and could clash with each other and with any attempt to impose a uniform national policy with respect to the economics of the industry' (Supple, 1984:214). Thus, the MAGB was originally formed when the state's interventions threatened local autonomy in the utilization of labour. In 1842, legislation had been passed placing restrictions on the employment below ground of women and very young children, and from the 1850s governments introduced Bills proposing certain uniform safety regulations. The MAGB's function - executed with the assistance of the mineowners' representation in Parliament - was to resist such intervention and to minimize the restrictions on labour utilization on

behalf of its constituents. The principal purpose of the national organization was therefore to oversee the passage and application of legislation impinging on the mineowners' affairs - safety regulations, but also matters such as taxation, Railway Acts, workmen's compensation. And since it was formed in defence of local autonomy, the MAGB was precluded from intervening in the business affairs of its constituents; matters of wage regulation, working hours and conditions remaining the preserve of the district associations. This was the situation until the early twentieth century when the defence of local autonomy increasingly required the districts to operate through the national organization.

From the early twentieth century, the miners achieved a growing unity around the demands for a reduction in working hours, a national minimum wage, and a national wage structure. But the owners could unite only in opposition to the miners' demands and to changes which in principle were in their collective interest. A reduction in the length of the working day, for example, was potentially a force for the progressive development of (capitalist) production. Its potential was to seal-off the option of relying upon crude methods of labour exploitation, thereby providing a stimulus to the consoldidation of the industry's fragmented structure by forcing employers to concentrate their attention on productivity-enhancing changes in production. In practice, however, the effects of the legislation were likely to be borne inequitably across the coalfields, because of variations in geological conditions and because of the existing variegated patterns of work organization. This is brought out in Daunton's (1981) study, which contrasts the circumstances of employers in the great northern and South Wales coalfields, and given some expression in the mineowners' public protestations .

> In various districts of the Kingdom working arrangements have been entered into between the employers and the men, some extending over a period of years, and the passing of such a measure (ie the eight hours Bill) would so alter the conditions under which those agreements were entered into, as to necessitate rearrangements which would inevitably cause serious friction and a dislocation of trade. (MAGB, Executive Council Minutes, 15.3.1907)

There might be short-term disruption for all mineowners but, as will be seen, different districts were also likely to be affected unevenly by the legislation. The only basis for a common employer policy was one of minimum concessions to the miners in order to retain maximum autonomy for individual districts and colliery firms (see also Fine et al, 1982). Through the Mining Association, the mineowners mounted a most strenuous opposition to the eight hours Bill.

On the eve of the First World War, the coalfields of South Wales and the North East together accounted for 40 per cent of aggregate British coal output. It has generally been accepted that mineowners in these coalfields faced similar competitive conditions; both coalfields were oriented towards the export trade, producing 40 and 31 per cent of the coal exported from Britain respectively. But geological conditions and structures of work organization varied markedly in these two major exporting districts and, as Daunton has argued, the social relationships created by these particular methods of production 'became an independent factor in their own right' (1981:596). Work relations impinged upon entrepreneurial decision-making and shaped definitions as to what constituted best practice technology.

While hewers in the North East were opposed to the MFGB's eight hours campaign, colliers and haulage workers in South Wales had a common interest

in a reduction in the length of the working day. They worked the same length of shift which was over three hours longer, bank-to-bank, than the northern hewer's shift at the beginning of the twentieth century, and a reduction in hours could be effected without altering existing working methods. But because the hours of coal-drawing were reduced with the passage of the eight hours legislation, mineowners in South Wales pressed for compensating changes. Initially they sought the introduction of double-shift working in place of the existing single shift system. Failing this, however, the owners in South Wales increasingly concentrated their efforts on securing reductions in the basis wage.

South Wales colliers were opposed to the introduction of double-shift working in the early twentieth century. The move from a single to a double-shift system presented a threat to the collier's safety, his control over his place at the coalface and his piecework earnings. The colliers' objections related in part to the nature of the South Wales coal seams which were friable and liable to "squeeze", and many miners considered that double-shift working would intensify dangers to life and limb (*Colliery Guardian*, 21.3.1919:670). Colliers in South Wales had never 'shared' their earnings; the arrangement of work meant that the 'marra relationship' of the North East had never developed. Mineowners were now attempting to introduce a system under which the collier's working place would be occupied by another workman on another shift; an alien practice which colliers viewed as ill-conducive to safety or practical working.

Northern hewers were far from keen on the shift from two coal-getting shifts to three, and had in fact stopped work immediately upon the new agreement coming into effect (Daunton:594). But the transition was secured in many instances, and the northern coalmasters could report to the Sankey

Commission of 1919 that the three-shift system was the 'acme of efficiency', and that it was to be recommended in preference to any extension of the hewers' working day (Sankey, Vol.1: 295, QQ 7549-7584). As Daunton suggests, it was probably easier for the northern mineowners to secure such a change than it was for their counterparts in South Wales to secure the introduction of double-shift working in an area where the single-shift system had formerly been 'universal'.

> Shift-work in South Wales in 1910 had all the terrors of the unknown; in the north-east, it was an accepted part of life and the marra relationship formed a close tie.
>
> (Daunton, 1981:595)

Mineowners in South Wales did not force the issue of double-shift working in 1910, and possibly because they were anxious to take advantage of the temporary disruption to work elsewhere. They did attempt, however, to reduce basis rates. They were unsympathetic to the miners' demands for a revision of piece and day-rates following the reduction in the length of the working day, and this bore most heavily on the day-wage workers who were unable to make-up their earnings by increasing the intensity of their work effort. Conflict between employers and workers was also heightened by the owners' efforts to whittle away at allowances for work in 'abnormal' places. If this initially appeared as an attractive option for employers, a means whereby they could avert direct confrontation with the union and reduce the basis wage by dealing with the men 'only as individuals' (Jevons, 1915: 527), it must soon have seemed otherwise. The dispute over payment for work in 'abnormal' places at the Cambrian Combine in 1910 spread across the South Wales coalfield, and was taken up by the MFGB in the demand for a minimum wage which was pursued in the industry-wide stoppage of 1912.

The issue of double-shift working again became the focus of conflict in South Wales in 1919. The Sankey Commission of that year conceded a one hour reduction in the length of the working day, applicable across the industry, and mineowners in South Wales pressed for a compensating change in working methods. The matter was referred to a sub-committee of the South Wales Conciliation Board and an agreement was reached whereby the double-shift system could be introduced, but only by mutual agreement of the management and men at the different collieries (*Colliery Guardian*, 20.6.1919:1491; 3.7.1919:30).

One of the South Wales miners' objections to the system had been that men employed on the afternoon or second shift would lose a sixth of their earnings, since the afternoon shift worked five days a week in contrast to the morning shift's six. The union pressed for the payment of a 'bonus turn' for double-shift pits, with an allowance on the piece-rate for men on the second shift to compensate for their shorter working week. The owners objected that no such additional payment had ever been made in the North East, but acknowledged that in Yorkshire, Lancashire and other areas the miners were demanding similar concessions in return for their agreement to work multiple shifts (*Colliery Guardian*, 24.10.1919:1101). But while the principle of a 'bonus turn' payment was conceded by the South Wales Conciliation Board, disputes arose at a number of pits where the employers were refusing to make such an award, and there was a series of local disputes over the double-shift system through 1920 and 1921. By the time of the 1926 General Strike, however, the South Wales mineowners had determined to act in concert on the matter. On the eve of the miners' lockout, they gave notice that they would be terminating 'bonus turn' payments and in future asserting their right to introduce double-shift

working at the face as and when they saw fit. A clause to this effect was inserted in the district 'agreement' on which the Welsh miners returned to work at the end of 1926 (*Colliery Guardian*, 3.7.1925:30; 3.12.1926:1229).

CONCLUSION

> Considering the close proximity of the coalfields of Great Britain, it is remarkable that so much variation should exist in the arrangements of labour and systems of working.
>
> (Bulman and Redmayne, 1951 revised ed.:306)

Economic and social historians of late nineteenth and early twentieth century British coalmining have emphasized the difficulties in regarding it as an homogeneous industry. Geological conditions varied markedly between and also within the different coalfields. Colliery companies raised different types of coal for different economic uses and markets. Structures of work organization were remarkably diverse even though the British coalfields were at a similar stage of development in the period before 1913, at least in terms of the technology of coal extraction. These variations in the arrangements of labour and systems of working partly reflected the influence of divergent geological conditions. But as this chapter has attempted to illustrate, they also reflected the outcome of struggles between mineowners and mineworkers.

Analysing the British coal industry's mounting economic difficulties in the years after the First World War, Court noted that divergent geological and market conditions served to divide the interests of mineowners. He went on to argue that the 'one great unifying factor in the coalfields....was the labour question' (1945:6). Like many other commentators, Court

considered that the unity and militancy of the miners - the labour challenge serving to unite mineowners whose interests in many other respects were dissimilar and sometimes opposed - required little explanation. It sprang from the peculiarities and dangers of pit work and from the isolation of mining communities, poorly integrated into the rest of society. From this perspective, therefore, mining trade unionism from the late nineteenth century onwards developed from and reflected the interests of a workforce already united by a common experience of work, social and cultural life.

In practice, however, and as this chapter has attempted to emphasize, miners did not share a common experience of work. Variegated patterns of work organization, different payment systems and systems of wage regulation generated a diversity of interests. These divisions were complex, running between different coalfields and grades as, for example, between pieceworkers and daywage men under the sliding scale system of wage regulation. Contributing to this differentiation was the butty or subcontract system which is discussed in the following chapter, and which could take a variety of forms and give rise to different sets of relationships between members of contract teams working within the same mine. Thus, the unity of the miners did not arise automatically from a common experience of work and, indeed, was initially difficult to establish.

In 1889, a majority of the autonomous district and county miners' trade unions that had emerged as more permanent associations came together to form the Miners' Federation of Great Britain. A loose-knit association, the MFGB initially had difficulty in pursuing a unified struggle, as for example around the demand for an eight hour working day. County unions in

the North East opposed the MFGB's policy and their opposition, as has been seen, related to the distinctive features of work organization in the northern coalfields. Following the passage of the eight hours Bill, the county unions of Northumberland and Durham joined the MFGB. At local levels, organization was built-up and extended as surface and non-face workers were included within the affiliated unions. And it was in spite of their heterogeneous work experiences and the immediacy of local grievances and disputes that the miners were able to achieve a growing unity around the demands for better health and safety provision, a national minimum wage and a national wage structure.

Mineowners were forced to respond. But while the 'labour quesion' acted as a unifying force, by virtue of their divergent circumstances and interests the mineowners were able only to ally around a policy consolidating the lack of stimulus to change and restructuring in the industry. The constitution and policies of the Mining Association - the owners' national federation - were defined by the district employer associations and in turn by their constituents. Policies had to accommodate the circumstances of the different districts, where geological and market conditions, systems of work organization and wage regulation varied. As the example of the eight hours legislation illustrates, the effects of uniform restrictions on labour utilization were likely to be borne unevenly across the districts. Mineowners could not agree to make broad concessions to the miners, and could forge their solidarity at a national level only around a policy that would preserve maximum discretion in the areas of employment and wage regulation for individual districts and firms. As the miners tried to engage the MAGB in wage negotiations, the owners' representatives retorted that the Association was not empowered to deal with such matters.

National wage settlements would impinge unevenly across the coalfields, while mineowners were determined to maintain the flexibility to sustain profitability by lowering wage rates as market and geological conditions changed.

The developing conflict in the industry was manifested by the national strike of 1912. That the miners' were able to sustain a national strike is evidence of the growing cohesion of the MFGB, and the dispute was settled only after a Minimum Wage Act had been rushed through Parliament. The miners' won the principle of a minimum wage, but since Joint Boards were established under the Act to fix the actual rates on a district by district basis, they had as yet to achieve a national minimum wage and national wage structure. Continuing their campaign, the implications of the miners' struggles over economic matters - improvements in wages and working hours - began to extend into more advanced political issues.

During the period of the First World War, certain government controls were imposed on the coal industry. Profit pool arrangements were introduced which allowed cross-subsidy payments to take place between different districts. Wage increases could thus be conceded on a national basis without forcing particular sections of the industry to the point of bankruptcy (for details, see Kirby, 1977). The miners pressed for the extension of these controls, and in 1919 presented the explicit demand for the nationalization of the industry. To these developments, the mineowners responded by strengthening their own federal organization (Supple, 1984). New powers were conceded to the MAGB but for the purposes of waging the campaign against nationalization, securing the abolition of wartime controls and limiting government 'interference', and reasserting the

discretion of districts to meet changing market conditions by exerting a downward pressure on wage rates.

Reviewing the development of collective bargaining in Britain, Clegg argued that the mineowners were flying against a broader trend in their 'passionate opposition to their national wage agreement which had been imposed on them by the coal controller during the war' (1979:67). For present purposes it is necessary simply to consider the implications for the industry's development. Wage flexibility may have been the precondition for the survival of particular sections of the industry where the influences of geology, land ownership, and/or work organization combined to inhibit amalgamations and mechanization. By the same token, however, it dampened the forces for change and thus served to consolidate the backward conditions within the industry.

CHAPTER FOUR: CONTRACT WORK AND THE BUTTY SYSTEM

INTRODUCTION

> Capitalism in its early stages expands, and to some extent operates, not so much by directly subordinating large bodies of workers to employers, but by subcontracting exploitation and management. The characteristic structure of an archaic industry such as that of Britain in the early nineteenth century is one in which all grades except the lowest labourers contain men or women who have some sort of 'profit incentive'.....I propose to call this phenomenon 'co-exploitation', insofar as it made many members of the labour aristocracy into co-employers of their mates, and their unskilled workers. (Hobsbawm, 1968:297-8)

Chapter three examined work organization in the British coalfields in the period to 1913. Hand coal-getting remained the dominant method of coal extraction in this period, with only some 8 per cent of British coal output undercut mechanically on the eve of the First World War. Colliers retained immediate control over the labour process. They performed, or at least supervised the performance of, the complete operation of coal-getting which entailed the separate processes of undercutting, ripping and filling the coal into the tubs brought to the face by haulage hands. Paid on a piece-rate system, they were subject to limited managerial supervision. They were exacted to work by the form of their wage, with their earnings dependent upon the amount of coal cut and filled multiplied by the job or piece-rate. But they might contract to cut and deliver coal at a piece-rate for which they undertook to engage and/or pay other workers from the total contract earnings. The remuneration of the contracting colliers would be a

piecewage, the amount of which varied inversely with the amount of fixed wages paid to their assistants and directly with the speed of working. Contracting colliers would therefore be under an incentive to ensure that their assistants were kept fully-employed during the working day or shift.

The piece-rate system, which was widespread in British industry in the mid-to-late nineteenth century, fostered the development of hierarchical structures of oppression and inequality. Writers in the nineteenth century developed elaborate typologies of such arrangements with, for example, Schloss (1892) distinguishing between sub-contracting, labour sub-letting, piece-master and piece-rate foremanship systems, and contract work or inside contracting. Twentieth century commentators, in contrast, have tended to group these arrangements together as the techniques of 'pre-scientific' management, although sometimes giving emphasis to one of two different forms. Braverman (1974) highlighted the subletting of labour - or what Marx referred to as the interposition of 'plundering parasites' between the capitalist and the wage labourer (1976:591) - and interpreted this as the means by which early capitalists temporarily evaded the responsibilities of management by buying labour in fixed quantities, rather than attempting to control labour power. Hobsbawm (1968) and Melling (1980) look at the piecemaster and internal subcontract systems, where employers minimized the expense and avoided the difficulties of direct supervision by off-loading the function of labour control onto workers under some sort of incentive to maximize the effort of other workers. Hobsbawm terms such arrangements 'co-exploitation'. But the term conveys a number of meanings, and it is important to emphasize that systems of inside contracting operated by placing the *wage-labourer* in command of the ***distribution*** of the contract earnings of a larger work group.

These different arrangements have been interpreted in some accounts as transitional forms of work organization, specific to the earliest stages of industrial capitalism and predating the (inevitable) imposition of more direct forms of managerial control characterized by the elaboration of formal supervisory hierarchies (eg Braverman, 1974). But the history of Britain's heavy staple industries defies any linear model of capitalist development, and here subcontract systems were remarkably persistent (see, for example, Lazonick, 1979, on the cotton industry). In the case of the British coalmining industry, a variety of subcontracting and contracting arrangements were practised in the nineteenth century and survived - in various guises - well into the twentieth century, alongside hand-hewing at the face. These arrangements are often grouped together under the common term of the 'butty system'. But they varied in form and could vary in practice and hence 'miners attached different meanings to the common term used for their description' (Goffee, 1981:479). Particular forms of subcontracting, moreover, persisted or were adopted in some coalfields but not in others in the late nineteenth and early twentieth centuries.

In this chapter, three principal forms are distinguished although it must be conceded that in detail, as in practice, there was some area of overlap between these arrangements. The first section of the chapter looks at contract work, or inside contracting, taken to be the 'more general form of skilled workers hiring or paying their unskilled, or skilled workers being paid by results while their helpers were paid on time' (Hobsbawm, 1968:300). In the coal industry, this arrangement was part and parcel of the apprenticeship system and survived, with hand coal-getting, in many districts into the interwar years of the present century. Learners worked under the instruction of a qualified coal-getter and were paid a steadily

increasing day-wage either directly by the company, or indirectly from the contract earnings collected by the collier. In some instances, however, the collier worked with an adult male assistant, paying the latter some lesser rate than his own and able to command the distribution of any additional contract earnings derived from their joint efforts. Access to piecework employment at the face was generally governed by age and also, in some districts, by family or kinship connections. Hence a discussion of the collier-assistant relationship necessitates a closer examination of the role of the working class mining family in recruitment to the industry and occupational status below ground in the mines.

In some districts in the early nineteenth century, women and girls formed part of the family-based work group in the mines; recruited by an adult male relation who was a coal-getter and responsible for enlisting his own auxiliary haulage workers. In this period, the collier might be recruited at a piece-rate by the mineowner, or by a subcontractor known variously as a chalter, charter master or butty. Discussed in the second section of the chapter, this was the big butty system whereby the subcontractor undertook to work a whole pit or group of pits in the same vicinity. The mineowner or, in this period possibly the landowner, would engage an agent to deal with sales and accounts, leaving the functions of labour management, organization and oversight of production to the butty or charter-master. The latter would undertake to extract and deliver coal at a piece-rate, or - in some instances - to raise coal and sell it, paying a royalty or rent to the landowner or landowner's agent. The butty's profit would largely be derived from the difference between the price of labour paid by the mineowner and that actually paid out to the workers he engaged, either at a piece-rate for coal-getting or daywage for underground transport workers.

But the butty or charter-master, who in all likelihood would have been an ex-miner, was in effect a small-time capitalist who supplied the working capital - horses, tubs and tools - of the mine and the technical expertise of mine working.

This system was largely confined to the first half of the nineteenth century, when small-scale mining enterprise predominated. Mineowners were able to minimize their capital expenditure, while butties were under an incentive to minimize their costs by driving haulage workers - mainly juveniles and young children - to overwork and exhaustion. Certain legislative restrictions on the utilization of female and child labour, and the introduction of a rudimentary code of safety regulations, contributed to its decline from the mid-nineteenth century. The expansion of production onto deeper coal measures and seams involved larger fixed capital outlays, and mineowners were more inclined to appoint waged or salaried officials to safeguard their investments. Charter-masters were forced to join forces with other owners of capital or to accept some lesser position in the mines as a contracting foreman or simply as a piecework coal-getter. Nevertheless, the big butty system survived in a few districts into the 1870s, and at some pits in the Black Country it persisted in only a very modified form into the first decade of the twentieth century.

With the increased scale of investment tied-up in deeper and larger pits, mineowners engaged their own waged or salaried officials to coordinate and oversee operations below ground. But it was found expedient in some districts to retain a modified version of the butty system, in order to maximize the intensity of work effort and output from individual stalls within a mine. This was the little butty system, described in detail in the third section of the chapter. Contracting colliers, stallmen, or butties,

controlled the piecework contracts for coal-getting at the face, and were generally selected by the mineowner or manager. In turn, they engaged or selected the members of their contract team, and paid their assistants - adult workers who might be qualified coal-getters in their own right - on a daywage or piecework basis. In practice the system could vary enormously, with some contract teams sharing their earnings and workload equally. But it offered employers the means to differentially reward and penalize operatives, and enabled them to circumvent the difficulties and expense of direct supervision. For where some relatively privileged group of workers retained control over the distribution of the contract earnings, they were under an incentive to maximize the intensity of work effort of their assistants and could use their position to differentially reward and penalize the members of their contract team. And since the system could divide workers, it could also inhibit a coherent challenge to its perpetuation.

Generally associated with the coalfields of the Midlands, the little butty system was also employed at pits in South Wales and in Lancashire in the period before the First World War. It persisted in some districts, notably Nottinghamshire, into the interwar years of this century and was adopted in the newly-developing Kent coalfield in the 1920s. So long as the system brought short-term results for mineowners, it could discourage investment in mechanization and technical change. In analysing its persistence in certain localities, therefore, it is necessary to consider the system's implications for workplace relations and labour solidarity and also the nature of inter-capitalist competition in the interwar British coal industry.

CONTRACT WORK AND FAMILY-BASED EMPLOYMENT IN THE MINES

It will be recalled that in Finlay Gibson's classification of underground labour (see chapter three), the haulage class - putters, fillers, trammers and hauliers - was sub-divided between (a) semi-skilled men who were qualifying as coal-getters by working under their instruction at filling the coal, and (b) semi-skilled men employed in driving the horses which pulled the tubs from the face to the primary haulage system in the main underground roads. Rowe (1923: 61-70) gives particular examples of the first sub-category. Thus in Lancashire, each collier 'works by himself, and pays a day wage to a lad, or young man called a "filler", who assists him generally'. In South Wales, the collier 'is assisted generally by a helper or "butty", as in Lancashire...They are paid day wages by the collier'. And in Lanarkshire, as a rule, 'each hewer works for himself, and is assisted by a "drawer", who thus corresponds to the filler in Lancashire, or the butty in South Wales'.

Through such arrangements the collier's skills were transmitted to subsequent generations of coal-getters. In all coalfields, some form of apprenticeship system operated with access to piece-work employment at the face governed by 'age-linked milestones' although, as suggested in chapter three, the nature and length of underground experience required before graduation to the face varied. Promotion to the face for the "filler" or "drawer" probably would not be automatic upon reaching a certain age, but rather dependent upon an 'opening' arising for a skilled worker at the particular pit. Thus, as Welbourne has reported in the case of the North East, a tension might be generated between coal-getters and putters where

the latter's promotion to the face was blocked for some reason and the younger men denied the terms and conditions of the piece-work coal-getters (1923: 232-252). And in some circumstances, coal-getters worked with day wage assistants who were adult males and unlikely to secure control over the piece-work contracts. Such arrangements are considered later in this chapter.

Access to piece-work employment at the face was governed by age and possibly also by family background. Hence in Lanarkshire, the hewers' drawers were 'sometimes boys, often boys working with their fathers' (Rowe, 1923: 67). In South Wales, the various grades of underground labour were 'as much an hereditary occupation as mining in general'. Thus:

> ....a timberer's son will often start as a collier's helper, and then when he is about nineteen or twenty years old, if he wishes to follow in his father's footsteps, he will leave the face, and become a timberer's assistant. (Rowe, 1923: 67).

Throughout the nineteenth century, coal mining in Britain was popularly regarded as an 'hereditary closed shop' (Hair, 1955: 268), with entrance to the industry restricted to juveniles from mining families. Such a view undoubtedly exaggerates the reality, since where labour was in demand mine owners could and did recruit 'external' adult male workers who might, at some stage, proceed to employment at the face. The period between 1830 and 1860, for example, was one of substantial 'external' recruitment, when the industry's expansion was made possible by the movement of adult workers engaged in other occupations into mining (Church et al, 1986: 224-234). But in the rural coalfields of the mid-nineteenth century, recruitment and training was organized on a family basis and even in the non-rural coal mining districts, where the 'hereditary closed shop' principle was weaker,

the role of the family in the recruitment and division of labour below ground cannot be underestimated.

Hall stresses the hereditary nature of coal mining employment and occupation within the industry in her thesis which examines the period between 1890 and 1914. She argues that in all districts it was 'still common for the boy to receive a training in the skills of hewing from his father or another family member, and to enter hewing as the "marrow" (mate) of that family member' (1978: 22-23). In evidence to the Eight Hour Day Committee, Parker Rhodes remarked upon the almost complete absence of external recruitment to the industry in the first decade of the twentieth century, although other witnesses noted that there were regional variations in the extent of external recruitment and engagement of adult males from other occupations (cited in Church et al, 1986: 229).

But while adult male workers from other occupations were recruited to coal mining, the available evidence suggests that except at times of very high demand for labour, the ability of 'non-mining' juveniles - other than pauper apprentices in the early nineteenth century - to enter the industry was slight. Since boys might be supervised by male family members other than their fathers, and juveniles from 'non-mining' families might enter the industry if they had more distant kin in coal mining employment, however, the possible network of recruitment was quite wide. The Children's Employment Commission reported in 1842 that, 'the great body of the Children and Young Persons employed in the mines are of the families of the adult work people engaged in the pits, or belong to the poorest population in the neighbourhood' (Report: 255). In isolated, rural mining areas the established mining community may have been the only source of labour for mineowners; the absence of alternative employment in such areas in turn

assuring them of a continuing supply of labour with colliers setting their sons (and in this early period, daughters) to work from an early age to eek out the household subsistence. But mineowners had other reasons to prefer internal recruitment and to actively promote an early familiarity with underground work.

Buddle - the pre-eminent mining engineer of the mid-nineteenth century - testified that, 'Our peculiar race of pitmen...can only be kept up by breeding' and that it 'never could be recruited from an adult population' (cited in Flinn and Stoker, 1984: 339). Employers valued the early 'socialization' of mining children to the discipline of underground work in the mines, and the skills thus acquired by workers who had commenced their underground 'career' at a pitifully early age.

> It was the experience colliers gained in distinguishing between different qualities of coal in the near complete darkness of underground working - an ability to sense or feel by the way the mineral responded to a blow from the pick, the nature of the 'metal'. This ability, put to the service of sending up to the surface only coal of the quality and size called for, could not be taught and could be acquired only by long experience at the coalface.
>
> (Flinn and Stoker, 1984: 339-340)

Colliers who commenced work below ground at an early age may have acquired experience. But their health, physique, and life expectancy were all liable to be distorted and diminished. Mineowners may have placed a premium on skill and experience. But equally a regular supply of new recruits was essential, given the industry's appalling health and safety record.

The arrangement of piece-work coal-getters working with an apprenticed day wage assistant assured mineowners of a continuing supply of skilled labour and also of a disciplined work-group at the face. The collier's

piece-rate might include the day wages of his assistant, or the latter might be paid directly by the colliery company. In either case, the collier's piece-work earnings would be dependent on his own and his assistant's effort, and the day-wage worker would be encouraged to keep up a good pace. If the collier intensified his own work-load, encouraging his assistant also to work more intensively, the former would normally be able to lay claim to any additional earnings. But it would be likely for him to attempt to retain his assistant's 'goodwill' by paying him some share as a bonus. Some writers have suggested that where this arrangement built upon familial relationships, the younger workers would be protected from ill-use and the 'harshness of the underground regime' softened (eg John, 1984). Others have been less certain. Humphries, who has looked at the employment of children below ground in the period to the mid-nineteenth century, concludes that 'there are as many examples of parental affection and protection as there are of child abuse' (1981: 13). The words of caution Lewis Jones had Len's new-found pit friend utter in *Cwmardy* would suggest that fathers might be as hard a task-master as any.

> You want to watch your old man on pay-day. Tell him straight from the beginning that if he want you to work he have got to give you trumps.....Fathers be the worst butties going. They do think their own sons be bloody slaves and do never think of trumping 'em. Oh, no. They do pocket that their bloody selves and the old 'ooman don't have a smell of it. (1979: 119)

But experiences would differ and Len is never actually heard to complain about his own father's behaviour towards him.

The Employment of Women and Children in the Mines

Prior to the legislation of 1842, boys might start work underground at the age of five or six. In some coalfields, women and girls were also employed below ground; recruited, as a rule, by an adult male relation who was a coal-getter and who was required to enlist his own ancillary haulage labour and to pay these workers from his piece-work earnings. The 1841 Census and the Children's Employment Commission of 1842 give some indication of the numbers of women and girls employed below ground at this time. But there is limited information as to the incidence and distribution of female underground employment before the 1840s. Humphries, following Nef, argues that female underground employment was a relatively modern phenomenon, 'produced by those same forces which led to the specialisation and wage dependence of men, for those forces could not but affect the women of the communities that were to become pit villages' (1981: 8). John, on the other hand, argues convincingly that women had worked in coal 'mines' for centuries, 'wives and daughters playing a vital role in the family economy, helping husbands and brothers to extract coal from easily accessible holes'. For John, therefore, female underground employment was associated with pre-capitalist, family-based work groups, and the 'perpetuation of pre-capitalist organisation and customs' under early mining capitalism (1984: 20).

By the early nineteenth century, women and girls formed only a small minority of the total underground labour force, were employed only in certain coalfields and, within these, in some districts and not in others. Total employment in coal mining in England, Wales and Scotland at the beginning of the 1840s has been estimated at 150,000, of which between 5,000 and 6,000 were females (Hair, 1968). Flinn and Stoker estimate that

some 2,000 of these women and girls were employed in the eastern part of the Scottish coalfields (1984: 334). The Children's Employment Commission reported that women and girls were engaged below ground only in the coalfields of Yorkshire, North Lancashire, South Wales and Eastern Scotland (PP 1845, XXVII). Flinn and Stoker estimate that they represented about 20 per cent of the workforce in the Scottish districts, about 6 per cent in Lancashire, and possibly less than 4 per cent in South Wales and Yorkshire. In some coalfields, women had been employed below ground before the nineteenth century but not thereafter. In the North East, for example, they had been employed at some pits up until the 1780s, and in Cumberland they had formerly been employed as 'bearers, fillers, hookers of baskets, clearers and as horse drivers'.

The reasons for the regional variations in female underground employment have as yet to be satisfactorily established. In the eastern part of Scotland women were engaged as 'bearers', carrying coal in wicker baskets on their backs up winding staircases to the pit hills. John suggests that this was associated with the 'system of slavery' imposed by the Act of 1606 which controlled the movement of hewers and bearers from one employer to another and remained in force up until the end of the eighteenth century .

> Originally designed to cope with a shortage of labour during the expansion of the coal and salt trade, this attempt to prevent owners appropriating miners meant binding families for life. It ensured that 'wives, daughters and sons went on from generation to generation under the system which was the family doom'. (John, 1984:22)

But while female underground employment was common in the Firth of Forth area, it was much rarer in other Scottish coal mining districts (Flinn and Stoker, 1984: 335).

Humphries argues that women were generally proletarianised later and less consistently than men, which resulted in 'significant regional variation in the recourse to female labour' in the 1840s. She argues that the *inclusion* of women in the underground labour force depended on a variety of local and regional circumstances, including:

> .....the relative importance of landowner/proprietors, their political power, the degree of labour scarcity, the availability of other employment including access to land, and the resistance of the working class to the imposition of capitalist relations of production. (1981:8)

John, in contrast, argues that female employment underground may have peaked before the nineteenth century and offers some - albeit limited and fragmentary - evidence of the factors leading to the *exclusion* of females before the legislation of 1842. Here she includes innovations in underground haulage, with adolescent males taking over jobs formerly performed by women and children; the increased employment opportunities in other industries by the early nineteenth century; and the higher wages paid to hewers in the North East which 'acted as a deterrant since miners would have been able to afford to engage older boys in place of females' (1984: 24-5).

In those districts where females were employed below ground, they were generally engaged on the same kind of work.

> They were primarily transport workers, that is they moved the coal from the face to the horses, if horses were used, otherwise to the bottom of the shaft. (Humphries:8)

> Their main task was to work as drawers. This involved pullying sledges or tubs along the pit floor or on planks from the coal face to the bottom of the shaft. (John:20)

Women competed for these jobs with children, not men. Only very rarely were women engaged as coal-getters or hewers; this work in most instances being reserved for adult males. Where they did become hewers, a 'shortage of male labour, rather than promotion, appears to have been the reason' (John, 1984: 34).

Whereas the use of female labour below ground was highly localized in the 1840s, the employment of boys was general. Boys undertook a variety of jobs - operating trapdoors in ventilating courses, baling water, and driving horses for all purposes - although most were in some way connected with haulage (Flinn and Stoker, 1984: 336-7). Hence, boys, girls and women filled the same sort of positions below ground, but whereas boys might follow a customary apprenticeship and graduate, in their late teens, to become coal-getters, women and girls would in general remain in the same occupation throughout their working lives in the mines. The coal mining workforce was thus divided into 'non-competing groups distinguished by age and sex' (Humphries, 1981: 11).

Humphries argues that this division of labour developed from and was sustained by the system of family-based employment, which in turn was based upon the decentralized system of labour recruitment. Women and children were engaged by their husbands, brothers or fathers. These adult male workers were coal-getters and regarded as the principal operatives. They were directly employed by the mineowner, agent or manager and paid on a piece-rate for which they undertook to enlist and pay ancillary labour for face and haulage work. Some female workers, however, were employed directly by the colliery company or owner's agent, even if these represented a very small proportion of the total. And while 'most female workers were hired by the colliers and paid by them', it was not invariably the case that the

collier who engaged them was also a relative. Thus in Scotland, the hewer 'generally engaged two bearers and perhaps shared a third 'fremit' (non-relative) with a fellow worker' (John, 22). Likewise in the case of boys who might be orphaned or a younger sibling and hence a potential recruit for a non-related coal-getter at the face, such as an unmarried hewer who had no immediate younger, male kin.

Mineowners secured a number of benefits from this decentralized system of labour recruitment. They did not have to find and hire the entire labour force, and their involvement in labour management was minimized since, 'Production was maintained by fixing a piece-rate that would allow miners to get their customary subsistence *if* they worked hard and *drove their assistants to similar heroic efforts*' (Humphries, 1981:12). Where the arrangement was underpinned by familial authority relationships, discipline may have been further enhanced. Owners could also claim to have no involvement in the employment of females and children. This was particularly convenient at the time of the publication of the Report of the Children's Employment Commission. While the details of conditions in the mines and, in particular, of semi-clad women working alongside men underground, provoked the wrath of Victorian morality, mineowners could claim that:

> Each collier employs whoever he likes... I exercise no control over them. I merely pay the men for the coal which they bring to the bank. (PP, XVII, 1842: 236; cited in Humphries, p.13)

But owners and their agents evidently were interested in recruitment and the composition of their workforce. They were anxious to get boys from mining families started in the pits at as early an age as possible. Buddle, for example, opined that unless boys were initiated into pit-work by the

age of thirteen or fourteen, 'they will never become colliers'(Flinn and Stoker, 1984: 339). Some employers admitted to preferring girls as they 'found them cheaper, less ambitious and more reliable than boys' (John, 1984: 42). And in some thin seam pits, the cramped conditions and inadequate investment in underground haulage necessitated the use of child labour on transport work.

Women and children were employed on the lowest status, lowest paid work below ground. Innovations in underground haulage over the early nineteenth century - the progression from sledges drawn by workers, through wooden 'rolley ways' to iron-railed tramways drawn by horses - had tended to see adolescent males displace female and child labour.

> Apart from a few female horse-drivers in the Cumberland pits, adults did not do this job which became the prerogative of boys aged between fourteen and seventeen. Such a sexual division of labour may have arisen because the work was envisaged as part of the apprenticeship of the future miner. Since women did not graduate to being hewers such a job would not have been seen as a necessary stage in a training process. (John, 1984: 23)

But the pace of change in haulage techniques was slow and uneven. Horses were capable of drawing heavier loads than humans and therefore of moving a greater quantity of coal to the shaft bottom during the day or shift. But they represented an expensive investment for the proprietor and were costly to replace in the event of an accident, whereas workers bore the cost of injury and loss of life themselves. Innovation in the methods of underground transport in some pits and localities could thus force a competitive response elsewhere involving the more abject exploitation of female and child labour.

In any event, the unevenness in production technique and in the use of female and child labour across the coalfields, meant that there could be no 'progressive' employer response to the Mines and Collieries Bill of 1842 which proposed the prohibition of female employment and employment of boys under 12 years of age below ground in mines. While a small minority of mineowners did support the Bill, possibly seeking to steal a march on their competitors who employed women underground workers, the majority were vehemently opposed. Where women were employed, owners would be forced to train and recruit substitute male workers with, more generally, the elimination of child labour forcing employers to invest in new methods of underground transport. In the North East, where many pits were relatively advanced in terms of haulage systems and female employment had by this time declined, the use of boys as putters at the face was still widespread. The most strenuous opposition to the 1842 Bill came from the northern owners who were well-represented in the House of Lords because a number of the largest northern pits were owned and operated by landowners (Humphries, 1981: 24; see also John).

The origins of the Bill, and the alliances developed in its support, remain a matter of intense debate (1). Passed as the Mines and Quarries Act of 1842, it prohibited the underground employment of women and children under ten years of age - the reduction in the age limit on boys entering the mines having been secured by the mineowners at the Committee Stage. Colliers who had formerly employed wives and daughters as their ancillary helpers were forced to recruit older boys and to share their earnings with non-related workers. Women obviously experienced a more immediate dislocation and loss of 'independent' income, and John reports the dire circumstances of those female workers who had been engaged by non-related

male workers in the mines and who were in turn supporting other dependent relatives (1984: 51).

In some coalfields, women continued to be engaged at the surface as pit-brow workers through the nineteenth and into the twentieth century. Again this was low status, low waged work and involved physically strenuous tasks such as pushing tubs from the pit shaft to the sorting screens. Work on the latter was subject to intensive managerial supervision, with pit-brow women workers liable to be the victims of sexual harassment.

> You were placed at equal distances down the belt and daren't move, even if there was a drip straight down on your head. If you kept moving, they'd put a box round your legs. You daren't talk to one another, or you'd be sent home. There was a glass ceiling over the belts. The boss used to lie on the glass on his stomach, looking through a hole to see what you were doing. Oh God! He was awful.....He'd shout through the hole, 'Off wi'em 'om'. That's the way he spoke. Then there was no pay, so we used to get thumped when we got home...
> (Pit brow woman worker, born late 1890s, cited in Forman, 1979:40)

Boys under ten years continued to be employed below ground up until the legislation of 1872 which restricted the age of recruiment to 12. The age limit was raised to 13 years in 1900.

THE CHARTER-MASTER OR BIG BUTTY SYSTEM

Colliers in the early nineteenth century may have been engaged directly by the mineowner or owner's agent, or by a subcontractor variously known as a charter-master, chalter or butty. Under this version of the butty system

the contractor undertook to work a whole pit or, in partnership with another such individual, a group of pits in the same vicinity. This is in contrast with the little butty system, which in some coalfields persisted into the twentieth century, and under which the contractor's sphere of control was confined to one or two stalls within the same mine with perhaps 10 to 20 workmen under his command. The charter-master or butty of the earlier period might have up to 100 workers in his charge. But there again, since in this period many pits were very small-scale ventures, he might employ no more than thirty to forty mineworkers.

The reign of the charter-master or big butty has been located in the very 'adolescence of industrial society', pre-dating the development - even in rudimentary form - of a professional managerial class, and when accumulation was largely dependent upon the immoderate proglongation of working hours (Taylor, 1960). By virtue of the uneven development of the British coalfields, however, this period has no uniformity or clearly-defined time boundaries. In the early nineteenth century, the big butty system was known in the Yorkshire coalfield, in the Midlands, North Wales and in South Wales at the pits of the ironmasters (Flinn and Stoker, 1984: 55-7; Church et al, 1986: 418). In the East and West Midlands, it persisted into the 1870s and at a few pits in the Black Country, into the first decade of the twentieth century (Royal Commission on Mines, 1909). In the North East, where a professional managerial cadre had come into existence by the early nineteenth century, the charter-master system was occasionally reintroduced to alleviate crises of management of a 'peculiar and transitory kind' (Taylor, 1960:233).

Taylor's analysis of conditions in the Black Country gives some insight into the forces serving to support the big butty system. The 'development' of this coalfield in the early nineteenth century took place in fits and starts, according to the state of the coal trade. Various factors combined to foster the proliferation of very small-scale mining ventures; the ease of working the coal, the prevailing system of land-ownership and fragmentation of indigeneous capital. Operating in an environment of 'fierce and unremitting competition', such enterprise enjoyed sporadic periods of success interspersed with much leaner times. Available labour in this 'frontier territory' was both 'undisciplined and restless' and frequently in scarce supply. In these circumstances, mineowners turned to the 'forceful' approach of the subcontractor to alleviate their managerial and labour problems, and the system recommended itself not least because the butty-man was not retained as a permanent official - representing a fixed overhead charge. The butty contracted to raise a given quantity of coal at a piece-rate, or price agreed with the owner, recruited and paid labour to complete the work. His income represented the difference between the prices received from the owner and his own costs. He was therefore under an incentive to extract the greatest possible amount of labour from the workers he employed within the shortest possible period of time - which for the miners meant long hours and overwork.

The charter-master or big butty system may have evolved from the 'collective contract' of the eighteenth century, described by Ashton and Sykes (1929) who identify its operation in Shropshire. Gangs of workers, joined in a relationship of 'co-partnership', worked shallow levels or drifts under a piecework contract negotiated with the land or mineowner. The formalization of contracts, mineowner's preference for dealing with one

man rather than a labour force, and for dealing with a man who could exert discipline over the gang, may all have contributed to the transmogrification of the 'collective contract'. By the early nineteenth century, the term butty was generally associated with structures of inequality and oppression (although there were always regional variations in its interpretation).

The butty-men of the early nineteenth century were generally miners or ex-miners who had accumulated some limited amount of capital (Church et al, 1986:417). Hence, in addition to their role in labour management, they generally supplied some or all of the working capital of the mine - tools, timber, tubs, candles, ropes, horses and even tram rails. Butties supplied working capital, an 'expertise' in labour management, and assumed responsibility for the organization and coordination of underground operations. Mineowners or, in this period possibly landowners working the coal seams as an extension of their agricultural estates, would generally undertake to supply the fixed capital in the form of the shaft, drainage, ventilation and winding equipment. The work of shaft-sinking, or the excavation of drift entrances in the case of shallow mines, may have been performed by specialist gangs working under contract. By the late nineteenth century, it was often undertaken by firms specializing in mine construction. In some instances in the early part of the century, however, butty-men undertook to complete the initial development work; that is, to open-up shallow pits and drift mines in addition to their contract for cutting, hauling and winding the coal to the surface, proping roofs, filling goafs and so on (Flinn and Stoker, 1984:55-7).

Butties might contract to enlist labour in the first instance, or simply to pay workers, 'either by the piece, in the case of pickmen working at the

face, or by the day, in that of bandsmen or hauliers' (Taylor, 1960: 218). Subcontracting was associated with various harsh and despotic practices designed to retain labour - payment by truck, long pays forcing worker indebtedness, and so on - although butties certainly did not hold a monopoly on such arrangements, the efficacy of which often depended upon the connivance and support of colliery proprietors. Mineowners exercised some control over the butties' activities through the contracts negotiated between the two parties. Within a particular locality, the form of the contract between the mineowner (or landowner) and butty might be quite standardized. But over the industry as a whole, there were marked variations in the division of responsibilites and this suggests that the charter-master system itself was an adaptable and varied arrangement. In general, contracts were of relatively short duration, enabling the mineowner to offset the risks of market fluctuations. But again, there were significant variations.

The butty might undertake to raise a given quantity of coal at an agreed price, or to raise coal by the ton at an agreed piece-rate. In either case, the butty's profit would largely be derived from the difference between the contract price and his own expenditure - on labour and materials. And since his income depended upon his ability to minimize costs, he would be under an incentive to 'drive' or 'sweat' workers who, in any case, would be forced to work long hours to achieve even a meagre subsistence given that their wage rates were likely to be some way below the price of labour paid by the mineowner. Butties often engaged supervisory assistants - 'doggies' or 'corporals' - to oversee the mineworkers and, in particular, the day-wage haulage workers. The system might obviously involve much brutality and physical degradation. But the experiences of the mineworkers could differ.

Thus, Griffin quotes a Nottinghamshire miner, recalling his experiences in the 1830s and 40s. This witness argued that 'A few of the butties...were humane and kind, but others were most cruel and brutish'. Some of their supervisory assistants he described as, 'slave drivers' who would 'arm themselves with a stick or thong, fix themselves in some convenient spot, and as a lad...came by with his wagon, which he had to push, would strike him on the back..' (1971: 43).

In some instances, butties would undertake to extract the coal, raise it to the surface and sell it, paying a royalty or rent to the landowner (Flinn and Stoker, 1984: 56-7). Here the contractor or partnership of contractors virtually became the mineowners. The landowner would supply the fixed capital of the mine, the butties undertaking to provide the working capital including labour. But the contractors would be obliged to maintain the fixed capital stock, or to reinvest some part of their profit in the repair of air and water courses, and they would undertake to drive new levels and fill old pits. Examples of this type of arrangement have been identified in the Yorkshire coalfield in the late eighteenth century and here the contracts were of relatively lengthy duration - eight, ten or even twelve years (Ibid).

The subcontract system might resolve the land- or mineowner's immediate difficulties, with the butty providing working capital, an expertise in mine working and a self-interested dexterity in labour supervision. But the butty's interest in maximizing short-term gain might operate to the mineowner's long-term disadvantage; if, for example, the butty's decision to work the most easily accessible seams gave rise to subsequent problems of subsidence and flooding. Mineowners could limit the butty's discretion principally through two means; firstly, by attaching various terms and

conditions to the contract negotiated with the subcontractor, and secondly by appointing salaried or waged officials to enforce these terms and conditions. Landowners generally engaged an agent, steward or bailiff to manage their estate. The land agent would be charged with the responsibility for arranging the terms and conditions of the butty's contract, and possibly also for organizing the sale of the coal raised, and for keeping colliery accounts and record books. Sometimes specialist mineral agents were appointed to organize the initial siting of pits and opening-up of the underground works, and they would be expected to oversee the activities of the subcontractors. In all probability the first 'viewers' were drawn from the ranks of the land and mineral agents.

Most commonly employed in the northern coalfield, the term 'viewer' signified a technician and manager, standing between the mineowner and mineworkers; an agent employed by the mineowner to direct mining operations, rather than to participate directly in the supervision of labour (see Flinn and Stoker, 1984:57-68). The term entered the glossary of coalmining in the North East in the mid-to-late eighteenth century, coinciding with the industry's expansion in that area from shallow and easily accessible seams to deeper coal measures. This expansion could be achieved only through the resolution of certain technical problems and difficulties - relating to boring, shaft construction, pumping and winding. Men who, through their position as agent or manager, had acquired a knowledge of coalmining and who were also familiar with geology, mathematics and the sciences, became vitally important to the coalmasters, and their involvement in resolving the problems of deep-mining sustained the rapid elevation in status and income of this managerial stratum. But deep mining and the consequent expansion in mine size raised problems for

colliery capitalists other than those of a narrowly technical nature, and the expanded scale of fixed capital investment involved also prompted mineowners to tighten their control over the general running and direction of the pits. Thus, while viewers were the forerunners of the professional mining engineers of the mid-to-late nineteenth century, they undertook a wide range of managerial functions.

The expression 'viewer' derived from the verb 'to view', or survey and value coal-lands and collieries. While some of the largest northern pits were owned and operated by landowners in the period before the 1870s, the majority were worked on lease. Increasingly from the late eighteenth century, as deeper pits were sunk, absorbing greater fixed capital outlays, landowners withdrew from active involvement in colliery enterprise to assume a rentier status. Acting on behalf of the landowner, a principal function of the viewer was to evaluate the property, and on the strength of this report attempt to attract capital to invest on the owner's estate. The prospective mineowner would probably also engage the services of a viewer to act on their behalf in the negotiations over the terms of the mineral lease. 'Consultant' or 'check' viewers - the elite of the viewer network - often worked for a number of mineowners, landowners or landed colliery proprietors; the apparent promiscuity of these agents possibly reflected the coincidence of landowner and mineowner interests, in the early part of the nineteenth century at least (see chapter 2).

Mineowners who engaged the services of a consultant viewer would expect for their fee a regular report on the state of their pits, advice on working methods, labour management, commerical policies and practices. Viewers organized the initial development of mines and, within the terms of the mineral lease, determined such matters as the location of shafts,

layout of surface and underground works. Their employment - which was becoming more common in areas beyond the North East by the mid-nineteenth century - would therefore restrict the discretion of subcontractors, since it would be the viewer who determined matters such as the order in which seams were to be worked. Viewers were also responsible for keeping colliery accounts and record books, which represented one means of exercising surveillance over under-officials, although generally such day-to-day administrative work would be allocated to the head or resident viewer - a full-time mine manager, rather than a part-time consultant.

Thus in the North East by the early nineteenth century, and consequent upon the working of deeper seams, expansion in mine size, and increasing scale of investment involved in colliery enterprise, a stratum of professional mine management had emerged. At larger pits, a well-defined hierarchy of directly-employed managerial and supervisory officials had been developed to execute decisions made centrally. At the top was the consultant or check-viewer, generally engaged on a part-time basis and whose commission related to the annual output or profits of the mineowner's pit or group of pits. Consultant viewers inspected underground works and had an extensive knowledge of minework (a few had started their careers as mineworkers). But they were not engaged in physical work or employed to directly supervise the performance of work. They were not participant supervisors, like the butty-men of the Black Country whose income in some cases may not have been much above that of the workers they recruited and paid. Consultant viewers were hired by mineowners for their knowledge of mining practice and expertise in a wide range of areas pertaining to the organization of production for profit. They undertook commissions to view properties in the North East, in other British coalfields and abroad, and

found an expanding market for their services with the expansion of mining onto deeper seams in areas beyond the northern coalfield from the 1830s and 1840s. Some of these men amassed considerable wealth from their consultancy work and went on to become mineowners in their own right, or at least co-owners in a mining partnership.

The leading check-viewers of the early nineteenth century ran informal 'schools', taking on as apprentices would-be viewers from the North East and other mining areas. Such 'schools' were more akin to small businesses, since apprentices and assistants undertook the work on the commissions secured by the check-viewer. Graduates went on to become head-viewers at one or other of the larger pits in the North East, or larger pits elsewhere in the British industry. Head viewers were full-time mine managers and supervised the work of assistant or under-viewers, in charge of a particular department such as maintenance, or the work of a particular shift. Reporting to the under-viewers were the overmen or onlookers - supervisory workers, employed on a daywage or on a weekly wage and in charge of a particular area of the pit. They allocated timber and materials, supervised the underground transport workers and measured-up the work performed by putters, brushers, rippers, and timberers.

Such an advanced managerial hierarchy was uncommon outside the North East in the period before the mid-nineteenth century. Elsewhere mine managers (variously known as grieves, stewards, bailiffs, oversmen) may have been employed to supervise underground operations, or mineowners would act as their own mine manager and be assisted by one or two supervisory agents, or labour management would be subcontracted to a butty or charter-master. The average size and depth of pits in the North East was very much greater than that of any other British coalfield in this early period, and the structure

and training of mine management apparently more sophisticated. Nevertheless, Taylor (1960) has identified instances where northern coalmasters had cause to reintroduce the butty system, albeit on a temporary basis. Admittedly, most of these examples are confined to the late eighteenth and very early nineteenth centuries. But it would appear that under the short-term pressure of rising working costs - wages, but also timber, livestock and so on - mineowners were advised by their viewers to replace the permanent staff of under-officials by contractors. This was either to cut overhead costs, or because the under-officials could not be effectively motivated to control pit expenditure and, in one case, because the under-officials had been identified as the perpetrators of 'several things which have the appearance of rogery', such as the 'fiddling' of pit bills (1960:223).

Viewers and mining engineers staffed the Mines Inspectorate, a government agency originally established by legislation in 1850. Appointed to prevent dangerous mining practice, the Inspectors were given feeble legal powers to execute their duties. Their influence, such as it was in the period before the 1870s, was exerted through reports, published annually, on the different mining regions. And these show that while the Inspectors were concerned for the mineworkers' health and safety, they were equally anxious to promote effective labour utilization in the coal industry. Practices such as payment by truck, and the payment of wages at ale houses, for example, were criticized primarily for promoting drunkenness and absenteeism, or for failing to promote discipline in the mines. From the outset, the Inspectors were highly critical of the butty system. They argued that it militated against safe and economical working.

Under this system, supervision by the coalmaster or his

> "bailiff" is lax and irregular, and by degrees the "butty" becomes almost the sole controller of the colliery and of those who work therein. He is unwilling to incur any outlay in building ventilating furnaces, in making or enlarging airways, or in erecting the needful doors and stoppings; and, consequently, the pits.....are indifferently aired. He allows the shafts and tramroads to get out of repair; he thinks iron "guide rods" and wooden "conductors" in pits are quite superfluous; tools, timber and other materials are by him grudgingly supplied; suggested ameliorations are objected to; his contract being terminable at short notice, he has no abiding interest in the mine; he feels no intense anxiety or definite responsibility concerning the safety and comfort of the workpeople;..... (Inspector of Mines, Report, 1851:12; cited in A.Griffin, 1971: 29-30)

Contrasting the 'scientific' training and aptitude of viewers and mining engineers with the purely practical expertise of butty-men, the Mines Inspectors argued that the subcontract system could only result in the 'unskilful' working of mines. But the fact that a pit might be 'exploited for its choicest pickings rather than its fullest yield' (Ibid) reflected more upon the butty-man's short-term contract and his skill in promoting his own interest. Mining engineers were urging a transition to salaried management. But as Taylor's analysis of the northern coalfield shows, the direct employment of under-officials was no automatic guarantee that the mineowner's interests would prevail.

Since the butty-man's income represented the difference between the prices received from the mineowner and his own expenditure, he was under an incentive to 'sweat' or overwork employees and ignore basic safety precautions. Such conditions of labour utilization obviously did involve a profligate use of labourers' lives. But there again, deep mining in the

North East had introduced fresh hazards for the mineworkers. The establishment of the Mines Inspectorate in 1850 owed much to the adverse publicity that the industry had received following a series of underground explosions at northern collieries. And since the northern pits were relatively large-scale ventures, these disasters had aroused public attention because they had resulted in large-scale loss of life.

The Mines Inspectors were highly critical of the big-butty or charter-master system. Up until the 1870s, however, their powers to outlaw its use were limited. Legislative changes from the 1870s may have had some effect. Under the Coal Mines Regulation Act of 1872, the owners of pits employing over thirty men were statutorily obliged to engage a trained and certificated manager, capable of drafting and enforcing safety regulations. The legislation, for which the Miners' National Association had campaigned, thus provided an 'impetus towards centralization of managerial control' (Church et al, 1986:420). The Mines Regulation Act of 1887 required mineowners to appoint underground deputies, or examiners, whose function nominally was to assist the certificated manager in the enforcement of safety regulations. But small-scale pits - where the big butty system was most likely to be retained - were excluded from the provisions of the various safety Acts, and there was ample scope for evasion. Referring to the high accident rate in the Black Country, the Royal Commission on Mines reported in 1909 that:

> Although the evils of the system have been reduced by legislation.....they are by no means eradicated in the Black Country.....Charter Masters often have relatives working for them, and sometimes appoint a son or brother to act as a 'doggy' and make the examination under General Rule 4, which they are disqualified by the Act from making themselves. It is more difficult to get at

> the facts respecting accidents in Charter Masters' pits than in others, the workmen seeming unwilling or afraid to give information.

Legislation did have some impact on labour utilization and management (see below). But a powerful force behind the demise of the big butty system was also the industry's expansion onto deeper coal measures and seams. This was financed by ploughing back profits and by the formation of partnerships (and subsequently joint stock companies) in place of individual proprietorships. The increased scale of fixed capital investment prompted mineowners to take measures to safeguard their properties, and insist that pits were worked in their interests alone. To retain their former independence, butties would be forced to join forces with other owners of capital and establish themselves as mineowners - an option that may have been open only to the partnerships or 'firms' of subcontractors. Otherwise, they might quit the industry to become storekeepers or publicans. Or they might be forced to accept a lesser sphere of influence and work under the direction of the full-time colliery officials appointed by the mineowner.

THE LITTLE BUTTY SYSTEM

Church et al (1986: 272-3) identify a change in the methods employed to maintain discipline in the mines in most coalfields over the period 1830-70. The trend was away from a dependence upon crude physical discipline and was prompted partly by legislative changes. By prohibiting the use of child labour below ground, the Act of 1842 decreased the scope for harsher regimes including corporal punishment. Terminating the ability to rely upon the 'cheap labour' of women and very young children for underground

transport work, the Act may again have had some force in undermining the conditions in which the big butty system flourished. The strength of demand for labour, which continued through the 'coal famine' of the 1860s, and the emergence of more permanent county and district miners' unions, also diminished the efficacy of earlier methods of recruiting, retaining and disciplining labour.

From the 1860s, colliers in some mining districts secured reductions in the length of their working day through local action and agreements (Ibid: 253). The Coal Mines Regulation Act of 1872 prohibited the employment below ground of boys under 12 years of age, and restricted the hours of work of boys under 16 to no more than ten a day (and 54 in a week). The legislation, which had knock-on effects for other grades, may have encouraged employers to consider ways of intensifying the hours of work. The Act of 1872 also obliged mineowners to appoint certificated mine managers. While larger firms in the Midlands and elsewhere had already moved to the direct employment of mine managers, responsible for the general oversight of underground operations (Griffin, 1971:40-3), the Act underpinned the trend towards the centralization of managerial control and diminution of the subcontractor's authority. Nevertheless, modified versions of the subcontract system were compatible with the employment of certificated mine managers, and consistent with employer efforts to maximize the intensity of work effort.

Where formerly employed, the big butty system was on the decline from the mid-nineteenth century, along with the associated practices of payment by truck and retention of labour through credit (or worker indebtedness). Discipline, especially in the areas of work attendance and quality of output, was increasingly maintained by managerial staffs employed directly

by the colliery company and charged with the responisibility for enforcing company rules. Some owners in the Midlands continued to rely on the butties to organize production at their pits into the 1870s. But larger firms - such as the Butterley Company in the East Midlands - now engaged viewers on a permanent, or full-time, basis to supervise the development of the pits and under-managers (or under-viewers) to ensure that production was organized and conducted in accordance with the viewer's instructions (A.Griffin, 1971: 31-2). At the Butterley Company, however, and elsewhere in the East and West Midlands, a system of contracting was retained in order to maintain labour discipline and maximize output from individual stalls.

Thus the little butty, contracting collier or stallman of the late nineteenth century worked a single stall or, possibly, a single district within the mine, had generally no more than 10 or 20 workmen under his command, and was obliged to accept the general oversight of the company's underground officials. Initially, however, there was a degree of overlap with the big butty system of the earlier period. The butty undertook to complete all the work in a stall, or given length of face; to get the coal and deliver it into tubs, set and draw the timber and complete the blasting where necessary. He negotiated an overall contract price with the proprietor or colliery officials, but then hired and paid labour to complete the work, 'according to an agreement in which the proprietor had no part' (Church et al, 1986: 419). The butty would also undertake to provide candles, gunpowder, timber and tools at a price agreed in the initial contract. But the legislation of 1887 obliged owners to provide tools, rails, safety lamps and explosives centrally while the various Mines

Acts forced proprietors to admit their position as employer and to at least register contractors' assistants on the colliery books (C.Griffin, 1969). Subsequently, pressure from the unions forced owners to negotiate minimum rates for stallmen and other grades of face-workers.

By the 1890s therefore, and as a general rule, butties or stallmen were engaged to maintain discipline at the face, but not to recruit labour in the first instance (A.Griffin, 1971; C.Griffin, 1969). The formal authority to hire and fire workers had been centralized under the control of owners and their salaried officials, although cases continued to appear in the courts where neither contractor nor owner would admit liability as the employer of a particular workman or group of workmen (*Colliery Guardian*, Vol LXXXIV, 10.10.1902: 787). Butties or stallmen undertook to complete all the work in a given length of face at a piece-rate, and to pay their assistants minimum shift rates (at least) from the total contract earnings. The piece-rate would normally yield the stallman's average earnings if he worked hard and/or encouraged his assistants to do likewise. Stallmen would normally retain control over the distribution of any additional earnings arising from the intensified effort of the work-group as a whole. If wage-rates were depressed, stallmen would be forced to intensify the work-load to maintain their earnings while the 'fillers' in their charge, paid on a day-wage basis, would have to work harder but without any financial compensation. If the pit was on short-time working, the stallmen might lay-off their assistants and perform much of the work themselves in order to maintain their earnings (Bulman and Redmayne, 1951).

The operation of the little butty system is normally associated with the coalfields of the Midlands. But it was also employed at some pits in South Wales, in Yorkshire, Lancashire and in some Scottish mining districts in

the late nineteenth and early twentieth centuries (Rowe,1923; Challinor, 1972). Since longwall mining predominated in the Midlands, the butty system has often been viewed as a form of work organization dictated by that method of coal extraction (Ashton and Sykes, 1929; Humphries, 1981; Taylor, 1960). With longwall mining, the supervision of coal-getting became more necessary since the face had to be advanced in as straight a line as possible. Supervision was facilitated to the extent that workers were concentrated on a continuous length of working face, in comparison with the isolated stalls of bord and pillar working (see chapter 3). In the Midlands, the stalls along the longwall face were quite large, with the gateways set possibly 40 or 50 yards apart. Each stall would be 'let' to one or two stallmen, or butties, who would in turn direct the activities of one or two 'pikemen' or 'holers' who undercut the coal along the length of the face, and two or three 'loaders' or fillers who filled the coal into the tubs and pushed these to the gateway for the haulage hands to remove. Bulman and Redmayne argued that:

> This division of labour.....is highly spoken of, and certainly seems better adapted to effective and continuous kirving, and to getting as much round coal as possible, than where one man is kirving, getting and filling in 5 or 6 yards of face independently of what his neighbours are doing, his only interest being to fill as many tubs as he can for himself during the five or six hours he is in the face. (1951: 229)

Nevertheless it was the stallmen, who Bulman and Redmayne identified as the 'most experienced colliers', who directed the workmen, set the pace of work, and coordinated the activities of the work-group which performed the complete operation of coal-getting. The deputy's supervisory role was

limited. Indeed, one of the attractions of the butty system for mineowners was that it obviated the necessity of employing supervisory staff to oversee face-work and hence kept on-costs to a minimum. Equally, it provided a buffer between the mineworkers and mine management, since it was the stallman who was obliged to maintain discipline. Having been assigned his stall, or length of working face, the butty's form of remuneration provided a 'self-acting stimulus' (Schloss, 1892: 82) to ensure that operations were completed promptly and that each member of the work-group fulfilled his allotted task. In the case of holers, it might be just such task or stint work; these members of the work-group paid by the yard, but having a definite length of face to undercut in their shift to attain their daily, or average earnings.

Longwall mining was increasingly adopted in other British coalfields over the nineteenth century; the pace of the transition from bord and pillar to longwall working accelerating in the period from the 1860s. As suggested in chapter three, the diffusion of the longwall technique in part reflected the efforts of mineowners to raise the overall productivity of the underground workforce by reducing the amount of 'oncost' labour employed in road building and repair work. Employers were no doubt concerned to maintain or increase the intensity of work effort at the coalface. But there is little evidence to suggest that the extension of longwall mining to other British coalfields was accompanied by the re-arrangement of labour along the Midlands' model.

In other areas stalls were often much shorter, with the collier and his assistant, or two colliers sharing their earnings, working in a space of 8 or 10 yards between the gateways and responsible for all the work in their 'place'. Of course some of these arrangements might operate very much like

the little butty system, although on a smaller scale and with the collier's authority over his assistant generally buttressed by an age differential. Where these small-scale work groups were strung out along a length of coalface, the deputy or pit official might be assigned a more active role, and charged with the responsibility for ensuring a regular advance of the working face. His ability to dictate the pace of work, however, would be dependent upon the operation of job controls with, in most instances, colliers resenting any managerial intervention in their work. In these circumstances, employer attempts to maintain or increase the intensity of work effort would probably focus on the negotiation of a suitably stringent piecework price list for coalgetting under the new method of extraction.

Contract work in the British coal industry was not confined to coal-getting at the face or, for that matter, to pits working longwall. In the northern coalfields, a version of the butty system had long been employed on drift work (*Colliery Guardian*, 30.7.1920: 321). Elsewhere, development (or 'heading') work might be performed under contract, with a skilled workman undertaking to drive new roadways and to pay the labour necessary from the total contract earnings (Goffee, 1981). In some Scottish mining districts, brushing and other repair and 'deadwork' tasks were organized on a gang or contract system (*Colliery Guardian*, 17.9.1920:819). At some collieries in Nottinghamshire, haulage work was performed on a contract basis with the 'getter out by contract' undertaking to haul coal from the face to the pit-bottom at a piece-rate, engaging the necessary labour and 'corporals' to oversee the work. But this arrangement appears to have been abandoned by the early twentieth century, with haulage hands engaged directly by the company on a day-wage basis (A.Griffin, 1971: 32).

Inter- and Intra-Coalfield Variations

Across the coalfields of the Midlands and, indeed between different pits in the same mining district, the details of the little butty system varied in a number of respects; size of contract, ratio of butties to other workmen, division of labour within the coal-face work-group. The stalls were generally smaller in Cannock Chase, Nottinghamshire and Leicestershire, than in Warwickshire, North Staffordshire and Derbyshire with, in the former group, usually no more than 6 to 8 workmen employed in a 'place'. Rowe (1923: 63-4) outlines the usual method of working in these districts in 1913. In North Staffordshire, three or four 'contracting colliers' shared equally and paid two assistants on day-rates. In Warwickshire, four 'stallmen' employed four assistants on day-wages. One or two stallmen shared equally in Cannock Chase, employing three or four others on day-rates. In Nottinghamshire, each stall was 'let' to a pair of butties who employed, or rather paid, a similar number of day-wage assistants.

Alan Griffin argues that in the East Midlands, the extension of the little butty system in the late nineteenth century was accompanied by an 'anachronistic relaxation of the division of labour' (1971: 118). Whereas the big butty of an earlier period had employed certain grades on piece or 'stint' work to perform specialist operations at the face, the butty or stallman and his assistants now performed all the coal-face operations as a team, with the exception of holing. Rowe argued, however, that as a general rule under the butty system in the Midlands, 'each man of the gang tends to do certain particular jobs; for instance, the least experienced men would be mainly engaged in filling the coal into tubs, while timbering would probably be done by the stallmen themselves' (1923:65). Bulman and Redmayne detail arrangements at the face in the thick-coal seam of South

Staffordshire. Contractors or stallmen undertook to extract and deliver coal into tubs at an agreed piece-rate, with heading work paid at a separate piece-price. The stallmen supervised the work of coal-getting, set the timber and ensured that a regular supply of tubs to and from the face was maintained. They paid a day-rate to one or two 'pikemen' who got the coal and, in the absence of the stallmen, set the timber and otherwise performed their duties. Two or three loaders were engaged on day-rates to fill tubs with coal and, if sufficiently experienced, sometimes helped out with holing and getting the coal down. Repairers were also engaged on a yardage rate to lower the floor and strip the roof.

Within the butty-team, therefore, some men were always training as coal-getters although they were not automatically guaranteed a future position as a stallman, controlling the distribution of contract earnings. Up until the early twentieth century at least, it was generally the case that the mineowners and their officials selected the butty-men who controlled the piecework contracts for coal-getting. As in the allocation of working places at the face, therefore, the butty system offered mineowners and their officials the opportunity to extend privileges to favoured workmen and to discriminate against those regarded as troublesome.

One of the most detailed accounts of the little butty system is given by Goffee (1981), and relates to its operation at the Snowdown Colliery in Kent in the interwar period of the twentieth century. This analysis indicates the great variation in arrangements that might be found even within the pits of a single company. In the process, it suggests some of the reasons for the persistence of the subcontract system, although care must obviously be taken in any attempt to generalize from Goffee's account.

It relates to the specific circumstances of one firm in the Kent coalfield in the particular context of the interwar years.

The Kent coalfield was developed from the early twentieth century, by which time mechanical coal-cutters could be purchased as standardized hardware (from US manufacturers) or as tailor-made items of capital equipment from British machine-manufacturing firms (see chapter 5). Goffee suggests that the owners of the Snowdown Colliery eschewed investment in coal-cutting machinery because of certain financial and technical considerations and because in the short-term productivity growth could be maintained through other means. High levels of capital expenditure were required to sink the shafts, open-out the workings and equip the pits in the first instance. The owners' immediate concern was therefore to produce 'as much coal as possible at minimum extra cost'. According to Goffee, geological conditions also rendered the installation of coal-cutters an 'extremely hazardous and expensive investment'. By employing butty-men, who possessed certain technical skills and considerable experience, the mineowners could realise their immediate aims, 'without the costs of either mechanization or an extensive managerial hierarchy' (1981: 492). The system 'worked' for a period, although the levels of labour productivity attained in the 1920s and early 1930s also reflected the fact that the most easily worked seams were being attacked.

The labour employed at Snowdown in the 1920s and 30s was largely migrant; expelled from the depressed coalfields of the North, Lancashire and South Wales. In this context, the butty-system obviated certain problems of labour management for the proprietors who were faced with a heterogeneous workforce - one coming to the coalfield with a variety of work and cultural experiences - although, of course, the cosmopolitan character of the

workforce may equally have facilitated the introduction of subcontracting. And as Goffee indicates, this heterogeneity was then heightened, rather than diminished, through work experience under the butty system which gave rise to a variety of work-group relationships and interests. Butties were engaged on coal-face and heading, or development, work at Snowdown. The size of contract teams varied with, in particular, the manner in which coal was transported from the face. On longwall faces served by mechanical conveyors, twelve to twenty men were employed on each of the two coaling shifts and five to six others on the night, or maintenance, shift. A head butty-man was present on each of the shifts and, beneath him, a 'chargeman' for every three or four coal-face workers. This type of contract therefore involved, 'perhaps three butty-men and thirty-five miners but half a dozen 'chargemen' would also be employed and were themselves regarded as intermediaries between the butties and the ordinary miners' (p 482). In the stalls, or 'headings', there were four men per coaling shift, one or two of whom were butties, and two men were employed on the ripping shift, one also being a butty.

Formal authority to hire and fire workers, and to allocate labour to work-places, rested with the manager and his overmen and deputies. In practice, however, butties often had considerable influence in the selection of their workmen and those controlling more than one contract and who were on good terms with management could 'influence whether or not men were signed on by the colliery company'. If the butties controlled the distribution of contract earnings, they were able to favour certain workers and to discipline others. The exercise of 'discretion' in this way enabled butty-men to attract and retain a regular group of men, and to engage those regarded as the 'better' workers. Mineworkers who held no regular position

with a particular butty and who had to apply daily for work, were known as 'market men'. A pool of 'excess' labour could be 'used to depress wage-rates: and it reinforced the disciplinary powers of the butties, who would quickly return a man to the market if he failed to exert himself to their satisfaction' (see also A.R.Griffin, 1971, and Krieger, 1984, on similar practices in the East Midlands).

Butties controlling more than one contract might not be obliged to engage in physical work in order to earn a comfortable living. Those with only a single contract were more likely to undertake certain tasks such as holing, or timber-setting, or even filling. In every case, however, 'the butties held a supervisory role, controlling the pace, coordinating operations and ultimately taking responsibility for the production of the gang' (Goffee:483). To fulfill these duties adequately required skill and experience. Butties collected the contract earnings, and paid out the minimum rates to their 'subordinate' workers. Butties would normally lay claim to a differential above the workmen and chargehands and might also retain control over the distribution of any 'surplus'. But this was not invariably the case, and there might be an informal agreement between the members of the butty-team to share contract earnings equally.

> Most men had to fight for their wages in the yard. I never did...I got in wi' a group - three 'Lancs' and a Kent lad - and we all worked together, and no-one had more than the other. (cited in Goffee, 1981: 486)

Similarly, in other coalfields where the little butty system was employed there might in practice be a variety of arrangements in and between different pits; in terms of the distribution of the work-load between members of the contract team, and in terms of the distribution of contract

earnings. Thus, while the system operated on a structure of inequality and privilege, the particular experiences of the workmen might differ. Butties might be regarded by their fellow workmen as 'idle men' who only appeared at the pit 'to pay out on a Friday', or as skilled men who deserved their higher income by virtue of their responibilities and experience. Goffee reports the different experiences of workers at the Snowdown Colliery, and the different ways in which they interpreted the butty system. Some miners argued that if the 'butty-men took a larger share then they had earned it through their superior skill and expertise'. It was a fair reward for their 'leadership' and 'responsibilities'. But others regarded the butties as the 'bosses men' who paid their workers insufficient wages whilst keeping the major share of earnings for themselves.

Labour Organization and the Butty System

In the various histories of mining trade unionism, the butty system is generally damned as an alien form of work organization, antipathetic to the culture and egalitarianism of the mineworkers on whom it was imposed by mineowners and their under-officials. Its decline is thus seen as inevitable, or attributed unproblematically to successful class struggle, organized and articulated through the miners' trade unions (eg J.E.Williams, 1962; and also Dennis, Henriques and Slaughter, 1956). But by extending incentives and privileges to a substantial group of workers, and affording the scope for a variety of individual experiences, the butty system tended to generate a diversity of interests. Hence in those coalfields where it was practised, the movement for its abolition could become the focus of conflicts within the miners' unions. The trajectory of

these local disputes, however, has to be analysed against the backdrop of broader economic and political developments.

According to Colin Griffin (1969), the Leicestershire Miners' Association had secured an end to the inequality of earnings distribution under the butty system by the end of the nineteenth century. In that coalfield, agreement was reached with the mineowners' association on the introduction of an 'all-throw-in' system whereby all the men working in a stall shared the contract earnings equally. In Nottinghamshire, opposition to the butty system gained its greatest coherence in the years immediately preceding and during the First World War when, across the coalfields, labour organization was gaining strenth. In 1918, the Nottinghamshire Miners' Association reached agreement with the owners' association on the introduction of an 'all-throw-in' system, under which all adult workers in a stall would share their earnings equally. At some pits, however, where the butty-men were prominent in the local union organization, the 'agreement was not implemented, or was implemented only for a short time' (A.Griffin, 1971: 192). And in Derbyshire, where the County union had secured an 'all-throw-in' agreement, a test case was brought to the courts at the beginning of 1919 because individual pits were reverting to (or retaining) elements of the butty system (*Colliery Guardian*, 24.2.1919:485).

Output and employment in Nottinghamshire - the largest of these three mining districts - had expanded rapidly from the late 1880s. From the late nineteenth century the coalfield maintained a positive rate of growth of labour productivity, at a time when output per man-year was falling in the British coal industry as a whole (Church et al, 1986:774). The Nottinghamshire coalfield's achievements partly reflected favourable geological conditions, but also the gradual concentration of output on new,

large-scale mines, sunk in the Mansfield area in the years immediately preceding and succeeding the First World War. The structure of work organization may also have played its part. Certainly the Nottinghamshire coalmasters were quick to express their dissatisfaction with the 'all-throw-in' arrangement. Leading mining engineers, who were either employed by or part-owners of the largest colliery companies, alleged that the abolition of the butty-system had contributed to a deterioration of work effort and discipline (*Colliery Guardian*, 28.5.1920:1503; 17.12.1920:1750). What is notable, however, is that many employers subsequently attempted to revive elements of the butty system rather than experimenting with new forms of labour control or new production methods.

The 'all-throw-in' arrangement had caused some discontent amongst the former stallmen and contracting colliers. In the Mansfield area of the coalfield, a group describing themselves as the 'more skilled labour' organized a petition to register their 'entire disapproval of the intolerable conditions under which the competent miner on the coal face is working' (cited in *Colliery Guardian*, 28.5.1920:1503). Their aim was to persuade their fellow unionists to modify the new, 'all-throw-in' system and re-instate an earnings differential.

> We have no wish to debar any competent or capable man from enjoying the full fruits of his labour, but we do consider that the incompetent and incapable man should not share in earnings which he is not justly entitled to. We therefore ask you to support and help establish a system which enables all competent and capable men to share equally of the earnings of any stall or contract. Also we protest against the proposed ballot re. all throw in and day work, seeing that we do not believe in either; and, further, we strongly object to boys, surfacemen, banksmen

etc., having a voice in determining the conditions under which the coalface men shall work.

The petitioners argued that they were not supporting a return to the 'old butty system'. By this they meant a system in which some two or three workmen who 'either from personal association with the powers that be or bribery and not necessarily because of their working ability were allowed to employ from three to twelve other men, working with and under them', and the choice of butty was a matter left 'absolutely to perhaps one official at the colliery'. Rather, the petitioners claimed, they were simply making an 'honest effort to place the skilled miner in the same position as skilled men in other trades' - by excluding from the equal division of earnings 'those at the one end who are either aged, physically deficient, or to whom any ambition is dead; and at the other end, only those who are serving an apprenticeship, in the application both of their strength and of their mind'.

Whatever the propriety of the petitioners' cause, it meshed with the efforts of some mineowners to rescind the 'all-throw-in' agreement and reinstate a version of the former butty system. The employer attack on the 'throw in' agreement became more vigorous after the industry-wide lockout of 1921. At the beginning of that year, and in the context of a slump in export markets, government controls on the coal industry introduced during the First World War were abandoned. The mineowners pressed for wage reductions and a return to district wage settlements. After a three month stoppage, the owners secured a return to work essentially on their terms. Wages were to be settled on a district basis, although in accordance with a national formula, and related to profits in the different districts. Wage reductions were imposed and although these were most severe in the export-

-oriented coalfields, in the inland districts of the Midlands and South Yorkshire earnings fell by around 16 per cent (Supple, 1987:164).

Under the national formula governing district wage settlements, standard wage rates had to be established - equivalent to the basis rates paid to different grades in March 1921, and the percentage additions payable in July, 1914. Standard wage rates were deducted as costs in the ascertainment of profits in the different districts. Minimum wage rates were set, so that wages were not to fall below 20 per cent of the standard rates agreed in each district for different grades. Following the introduction of the national wage agreement of 1921, mineowners in Nottinghamshire and also in Derbyshire signalled their intention to pay the contractors' - or skilled rate - only to 'those who are recognized by colliery companies as contractors or butties' (*Colliery Guardian*, 30.12.1921:1795).

Officially, the Nottinghamshire Miners' Association (NMA) was committed to upholding the 'all-throw-in' agreement. But the union was increasingly incapacitated. Ending the 1921 lockout heavily in debt, the NMA had imposed substantial levies on its members and reduced benefits, and membership declined from the early 1920s (Griffin and Griffin, 1977). The NMA was attempting to enforce the 'all-throw-in' agreement in the face of employer efforts to re-establish elements of the butty system. But divisions within the union on the issue had surfaced before the 1921 lockout, and these were exacerbated by the reductions imposed under the new wage agreement. While delegates from a number of lodges were urging the leadership to take a firm stance against the butty system, elsewhere in the coalfield new organizations were emerging in opposition to the NMA and the

wider Miners' Federation, and were explicitly declaring support for the privileges of butty-men.

Important developments in this respect took place at the new, large-scale pits sunk under Sherwood Forest in the years between 1919 and 1925. The firms involved (which included the Bolsover Colliery Co. Ltd and Barber Walker & Co.) were evidently attempting to stamp a particular imprint upon labour relations and the character of union representation. As part and parcel of the initial development work, they built extensive housing, organized the provision of welfare amenities, and constructed entire 'model' villages around the works. Welfarism on this scale was praised by the Samuel Commission of 1925-6, but damned by other contemporary observers as the imposition of a 'new industrial feudalism' (cited in Supple, 1987: 184). Employer support for the butty system at these pits of course may, in the first instance, have simply represented an attempt to recruit and retain a core of workers with particular technical and behavioural skills. And since the workforce recruited to these new mines was largely cosmopolitan, active opposition to the system had less chance of emerging. But at some pits - and notably those of the Bolsover and Barber Walker companies - the butty system quickly became associated with the recruiting activities of the British Workers' League (BWL).

Butty-men and contractors at these pits began to organize committees to represent their particular interests, although whether such committees were inspired by, or rather attracted attention from the BWL is unclear (see Griffin and Griffin, 1977). There is scant evidence to suggest that the companies concerned formally extended recognition to these sectional organizations in the period before 1926. But the suspicion articulated by activists within the NMA was that members of the BWL were given

'preferential treatment, and....made "butties" in the best stalls' (cited in *Colliery Guardian*, 20.4.1923:949).

By 1923, the NMA was in a 'disorganised state' (Ibid). The leadership was under pressure from some sections to take firm action on the issues of non-unionism in the coalfield and the steady reinstatement of the butty system. But members involved in the re-institution of the butty system - in its various guises - and with other grievances outstanding, may have been prepared to quit the NMA if it pursued a firm stance on the matter. In any event, with union officials equivocating on the precise definition of the butty system, delegates from some lodges warned of the 'real danger of a definite split' in the NMA (Ibid). This, of course, was actually postponed until the General Strike and miners' lockout of 1926. The events precipitating the formation of the breakaway 'Spencer', or purportedly non-political Nottingham and District Miners' Industrial Union, apparently took place at the Bolsover pits. Four months into the lockout, the BWL-inspired (or associated) butties' organization met with the company management and agreed terms for the resumption of production. Immediately, other companies in Nottinghamshire and also in Derbyshire opened their pits on the same terms, and since firms were recruiting non-unionists and 'strangers', there began a steady return to work (see Griffin and Griffin, 1977).

A variety of butty systems were practised at Nottinghamshire pits in the 1920s. These ranged from the 'old' system, with one or two men controlling the selection of contract teams and distribution of contract earnings and able to reward and penalize other workers for compliance in fulfilling butty-dictated work 'stints', to modified 'throw-in' arrangements resurrecting a differential between members of the same work group. Given these permutations, it is perhaps hazardous to generalize on the

implications for workplace relations, work effort and productivity. Nevertheless, Krieger (1984) suggests that unemployment in the coalfield in the 1920s and 1930s buttressed the butty-men's authority in production, and since mineworkers could secure regular employment only by complying with the dictates of the butties, the system operated to sustain high levels of work effort and the relatively high level of labour productivity of the Nottinghamshire coalfield. Krieger argues that output per manshift was higher in Nottinghamshire than in neighbouring Yorkshire, and that this cannot be attributed to geological conditions which he suggests were more favourable in the Yorkshire coalfield. He suggests that Nottinghamshire's superior performance owed much to the butty system which was not employed in the Yorkshire coalfield in the interwar years (pp91-2).

There are problems with this account, however, and not least because available details on labour productivity in Yorkshire relate to the whole county which actually embraced two distinct mining districts. In South Yorkshire, geological conditions were extremely good. As in Nottinghamshire, productivity increases had been secured from the early twentieth century through the gradual concentration of output on large-scale pits. West Yorkshire was an older district where the best coal reserves had long since been exhausted. Production had moved onto thinner coal seams, while little had been achieved in terms of the concentration of output on fewer and better mines. It is therefore difficult to establish whether output per manshift in Nottinghamshire was significantly higher than in the South Yorkshire coalfield. But it is clear that the rate of growth of productivity in Nottinghamshire in the 1930s was associated with the more intensive application of mechanical coal-cutters and face conveyors, rather than simply with work intensification under the butty

system. The proportion of output cut mechanically rose from 27 to 70 per cent between 1929 and 1938. In South Yorkshire only 56 per cent of output was cut mechanically at the end of the interwar period. Both coalfields enjoyed the benefit of relatively favourable market conditions, however, so that while the level of mechanization in Nottinghamshire fell behind that of some exporting districts - notably Northumberland - pits were able to operate nearer to capacity in the 1930s (although, even in Nottinghamshire, productivity growth was constrained by surplus capacity in the industry).

It could be argued that because mineowners in Nottinghamshire were able to secure the re-introduction of the butty-system (and wage cuts) in the early 1920s, the incentive to apply machinery more intensively in this period was weakened. But obviously the conditions of competition were also a factor, and in the early 1920s levels of mechanization were extremely low in most British coalfields and certainly in those districts which were, like Nottinghamshire, oriented towards inland UK markets. In any event, the introduction of coalface machinery in Nottinghamshire eventually displaced the butty system. Where coal was undercut mechanically and loaded (by hand) onto mechanical conveyors at the face, an 'all-throw-in' agreement was re-instated (Griffin, 1971: 192-3).

At the Snowdown colliery in Kent, the butty system persisted alongside hand-hewing at the face into the late 1930s, and the rate of growth of productivity - at Snowdown and in the Kent coalfield as a whole - deteriorated after the early 1930s. Here, a variety of factors would appear to have combined to militate against modernization, although these included labour relations and the influence of the butty system. Production in the Kent coalfield was actually coming on stream in the 1920s, when output and employment were falling in other British coalfields. Kent absorbed labour

expelled from the depressed coalfields of the north of England and South Wales, and workers coming to the pits were in a weak position to bargain over the terms and conditions of employment. Work experiences under the butty system inhibited the development of labour solidarity at pit level, and a coherent opposition to subcontracting failed to emerge. Goffee notes that at Snowdown 'the range of subcontracting arrangements and differing impact of the system, even amongst those employed on the same contract, made a common response unlikely since there was no foundation of a common experience' (1981:488). The men were divided, but there was no simple cleavage between butty-men and other grades. Rather, 'the system splintered the workforce into numerous small, mutually competitive sects'. During the 1920s and 1930s, there was only one pit-wide strike at Snowdown, apparently in response to the company's proposal to cut shift rates. Conflict was expressed, but through small-scale stoppages of short duration, and through a rapid turnover of labour which in turn undermined the men's ability to act collectively.

While labour relations did not constitute an effective force for change, the owners of the Snowdown pit were not coerced into modernization (as an alternative to bankruptcy) by the pressures of inter-capitalist competition. Indeed, it is a reflection upon the technological backwardness of the British industry that the Kent coalfield was able to 'develop' in the interwar period with, essentially, the production methods of an earlier era (although conveyors were employed on some faces). Certainly at Snowdown increases in labour productivity were secured in the period to the early 1930s. But this owed in large measure to the fact that the pits were working the most easily accessible coal reserves. In the absence of technical innovation, productivity fell as production was forced onto more

difficult seams. In the context of a changing external labour market, the employers also encountered recruitment difficulties from the late 1930s and were forced to revise existing practices. The butty system was abandoned as the pit 'officials' were given an enhanced role in the organization and supervision of work. New payment systems were introduced on faces where the coal was hand-filled onto mechanical conveyors, in an attempt to hike-up the intensity of work effort. But coal-cutting machinery was not introduced and across the Kent coalfield, hand-hewing at the face predominated throughout the interwar period. In 1938, only 10 per cent of the coalfield's output was undercut mechanically (Annual Report, Secretary for Mines, 1938).

CONCLUSION

> In no other industry is expenditure on supervision so low, relative to wages cost, as in coal-mining; yet in no other industry is supervision more difficult to apply, nor any in which it is more necessary.
>
> (Sam Mavor, machine manufacturer and mining engineer, 1924)

Systems of subcontracting, inside contracting, and piece-rate foremanship were employed in a wide range of British industries in the nineteenth century. Fostered by the piece-rate system, these arrangements enabled capitalists to minimize their involvement in labour recruitment and labour management by delegating these to some operative, head worker or attendant engaged at a piece-rate for which the latter undertook to enlist and pay assistants, helpers or subordinates. Such arrangements have been identified as transitional forms of work organization, specific to the earliest stages of industrial capitalism, and destined to be displaced as capitalists assumed the 'essential function of management' - control over the labour

process (Braverman, 1974). But they were remarkably adaptable, and in Britain's export-oriented staple industries they were also remarkably persistent.

In the case of coalmining, the big butty system was on the decline from the middle of the nineteenth century. The increasing scale of capital investment involved in sinking deeper and larger pits prompted mineowners to secure tighter control over the use of their properties. Officials engaged directly by the owner, partnership or company were made responsible for the general oversight of underground operations. This centralization of management control was encouraged by the various safety Acts introduced from the final quarter of the nineteenth century. The Miners' National Association and, subsequently, the Miners' Federation of Great Britain, campaigned for improved health and safety provision, although pressure for legislative change also came from outside the coal industry. And while mineowners were concerned to safeguard their properties, they displayed a casual respect for the health and well-being of their employees. They were opposed to uniform restrictions on labour utilization and the safety Acts that were passed were very often much weakened versions of the provisions originally proposed (see chapter six).

While the big butty system survived in only a few localities beyond the 1870s, the modified form of piece-rate foremanship - or the little butty system - was retained in a number of districts and notably the coalfields of the Midlands. The system offered employers a means of maintaining work effort and discipline in individual stalls, or working places at the coalface, in conditions in which the direct supervision of labour through an extensive managerial hierarchy would have been difficult and costly to

impose. Alongside the little butty system, and often indistinguishable from it, was the analagous form of groups of piecework colliers (or stallmen) jointly employing (or at least paying) daywage assistants, and the more general form of colliers working with a single assistant, possibly a relative and probably a learner or apprentice.

Each of the above arrangements afforded the scope for inequality in the division of contract earnings and bullying in the performance of work. Actual experiences varied, however, and arrangements classified as the little butty system might embrace an extreme inequality in the division of earnings and examples where the work group shared the work and remuneration equally. Relationships between butty-men and management could vary, even within the confines of a single mine, and butties retaining control over the division of contract earnings in turn might be forced to extend some of their privileges to others employed on the same contract, in order to motivate their 'subordinates' and retain a regular group of trusted workers. These variations are to some extent reflected in the different meanings attached to the term 'butty' in different coalfields and over time - friend, mate or partner, 'parasite' or overseer.

Versions of the little butty system persisted in some districts and localities into the 1920s and 1930s, alongside hand-hewing at the face. In an attempt to account for the survival of ostensibly archaic forms of work organization, this chapter has drawn attention to local circumstances, the nature of changes introduced elsewhere in the industry and the pace of innovation, and the broader pattern of industrial conflict in interwar British coalmining. Mechanization, which forms the subject of chapter five, was a protracted and uneven process in the British industry. Geological conditions, the uneven effects of the royalty system, and

divergent structures of work organization, combined in different ways to affect the suitability of mining districts (and pits within them) for technical innovation. To allow for these variations, mineowners adhered to the policy of resisting national wage settlements and uniform provisions relating to labour utilization. In the 1920s, the owners secured a return to district wage settlements, wage reductions and an extension of working hours. The effect was to consolidate the backward conditions of the industry, by supporting the survival of small mines and unmechanized pits. Thus, production in the newly 'developing' Kent coalfield could come on stream in the interwar years with the technology and structures of work organization of an earlier era.

In conclusion, it should be emphasized that subcontracting was not invariably displaced by the transition to 'machine mining'. In the interwar years, only the process of undercutting the coal was mechanized. Other tasks continued to be performed manually. But the partially-mechanized mining system involved the imposition of a new and extreme horizontal division of labour at the face. The work was sub-divided and narrowly-defined tasks were arranged in rigid sequence over three separate shifts in a twenty-four hour cycle of operations. The new system of work organization created fresh problems of labour management for employers, and these are discussed more fully in chapter five. Briefly, the rigid work sequence and interdependence of tasks created the need for greater coordination of the production process and greater coercion of miners now performing a single aspect of the work. With hand coal-getting, there may have been some division of labour within the work group, but the arrangement was flexible. Skills were retained within the coalface work group which performed the complete operation of coal-getting on the same shift, and workers could

interchange while aspects of the work could be left unfinished at the end of a shift. Such flexibility was lost with the 'unit' or partially-mechanized mining system, and in an attempt to evade the new stresses and strains placed on the management organization (and the implications for overhead costs), employers in some instances reverted to the subcontract system. Examples of this have been identified in some Scottish mining districts in the years immediately preceding the First World War (Campbell, 1984).

CHAPTER FIVE: MECHANIZATION IN THE INTERWAR BRITISH COAL INDUSTRY

INTRODUCTION

Two characteristics of coalmining in Britain on the eve of the First World War were stressed in chapter three; the extreme labour intensity of coal production and the heterogeneity of work organization across the British coalfields. In neither respect did the interwar years witness dramatic changes, in spite of the extension of 'machine mining' in this period. The production process was only partially-mechanized. Machines were introduced for coal-cutting, and mechanical conveyors were installed to transport the coal from the face to subsidiary haulage routes. But the coal continued to be hand-filled, while road building, road maintenance, and other underground operations remained labour-intensive processes. Mechanization was a slow and uneven process in the British industry, and throughout the interwar years systems of hand working and partially-mechanized mining co-existed - quite often within the same mine.

This chapter looks at the mechanized longwall mining system that was established as the dominant system of machine mining in the British industry in the interwar years. The system entailed an extreme horizontal division of labour and a three-shift cycle of coal-getting operations. The chapter considers the implications for the collier's skills and control over the pace of work. It goes on to examine the uneven pace of mechanization, and the influence of regional and intra-regional variations in the organization of production on employer policies and practices at the level of organized collective action.

TECHNICAL INNOVATION AT THE FACE

Method of Extraction

The different systems of coal extraction employed in the British coal industry in the period to 1913 have been examined in chapter three. These divide into two principal types - bord and pillar and longwall mining - although numerous modifications and hybrid versions of these were practised, with different techniques sometimes employed within a single mine. Bord and pillar working involved two separate extractive operations. In 1830, most coal in Britain was won from one or other version of this system. But longwall mining, or the continuous extraction of coal along a broad coal face of tens (and later, a hundred or more) yards, was extended from this period, with the pace of the transition to the longwall system accelerating in the years between 1860 and 1880 (Church et al, 1986: 336).

Geological conditions in part account for the extension of the longwall system in Britain. With bord and pillar working, headings were driven into the coal to lay-out the area to be worked in advance. These parallel roads, driven outwards from the shaft pillar to the boundary, were connected at intervals by roads driven at right angles, with the coal initially extracted along the lines of the roadways and the solid pillars of coal subsequently worked-off in 'slices'. But the slow rate of advance by 'narrow work', and of pillar extraction, 'often resulted in excessive crush over the workings, a low percentage of extraction, difficulties in ventilation and increased deadwork' (Reid Report, 1945: 39). While the headings were driven in solid coal, they had also to act as haulage routes. Hence, with the working of thinner seams at a greater depth from the

surface over the late nineteenth century, much stonework and ripping was required to ensure that the roads were of a sufficient size to allow trams or tubs to pass. This meant rising costs, with a smaller proportion of the underground workforce actually engaged in coal-getting.

The longwall method might offset this cost, reducing the amount of road-building necessary. It was the method of longwall advancing, with the coal worked outwards from the shaft pillar, which was employed in the British industry. With this technique, tramroads to the face could be kept short, while profitable coal-getting could begin with the minimum of delay after capital had been committed to opening-up a pit. Nevertheless, the tramroads to the face had to be constructed in the goaf and this work, together with the excavation of material for packing, absorbed a considerable amount of 'indirect' labour.

The extension of longwall mining over the interwar period of the twentieth century was associated with the application of mechanical coal-cutters and conveyors at the face. By the end of the Second World War, 74 per cent of British collieries employed the longwall system and 90 per cent of British coal was got from longwall faces advancing from the shaft (Reid Report, 1945: 42; Supple, 1987: 30). It is important to emphasize, however, that unmechanized and mechanized longwall mining were radically different.

> .....longwall as it was understood in the century before 1913 differed from the method described as longwall in the mid-twentieth century - whereby the coal was got in straight strips a hundred metres or more wide. Nineteenth century longwall mining generally involved the coal-face advancing in a stepped line, or fanning out from the bottom, to form a series of well-defined working places which were the province of one or two hewers and the putters who removed the coal from the face. (Church et al, 1986: 328-9)

Of course, the size of stalls (individual working places) varied between districts and coalfields pre-mechanization, as did the complement of the coal-face work group (see chapter four). But the work group performed the complete operation of coal-getting - undercutting (or holing) the coal and filling it out on the same coaling shift - and retained immediate control over the pace of work.

Holing by hand was an arduous job. For some commentators (eg Stewart, 1935:35), it was also the most skilled element in the operation of coal-getting. This part of the work was mechanized in the inter-war period. Mechanical coal-cutters were a labour-saving technical innovation. Working with machinery, three or four men could perform in their shift the work of fifteen or more hand-holing colliers without exerting any additional effort. Coal-cutting machines were developed from the 1860s. In the British industry, however, their practical application before the twentieth century was extremely limited. In 1900, only 1.5 per cent of British coal output was cut mechanically. In the same year, a quarter of the output of the US bituminous coal industry was undercut by machinery and American writers have commented on the slow pace of technical innovation in that country (eg Dix, 1979: 165).

Coal-cutting machines were principally adapted for longwall applications in Britain. In order to maximize the use of machine capacity in a working shift, coal-cutters were employed to undercut a continuous length of working face. With their introduction therefore, the small, self-contained stalls of hand coal-getting were displaced, and a length of face - of 100, 150 or 200 yards - was worked as a single 'unit'. The work was only partially-mechanized. The coal continued to be blasted-off the face and filled, by hand, into tubs or onto a conveyor. Changes in the social

organization of production, considered in the following section of this chapter, were designed to bring workers at the face to work with the strength and regularity of the machinery; that is, to raise the intensity of labour, or secure the expenditure of more labour during a given period of time without any increase in the numbers employed. A more intensive division of labour was imposed, and faceworkers were concentrated into large collectivities with 40 to 50 men employed on a single 'unit' of mechanized longwall face. Power-loading equipment was introduced after the Second World War, to 'replace the large body of men employed in the laborious and tedious job of hand-filling' (Anderson and Thorpe, 1967: 776). This phase of coal-face mechanization, however, is beyond the scope of the present study.

Coal-cutting Machinery

The development of a mechanical substitute for the hand-holing collier was dependent upon innovations in the generation of power and its transmission below-ground in mines. Steam power had been employed from the early nineteenth century, for pumping and haulage. But it was difficult to use at any great distance from the shaft, and presented an enormous safety hazard. Compressed air, introduced from the 1850s, offered an effective supply of power underground since it 'allowed transmission into a mine in any direction and for almost any distance' and, in contrast with steam, 'heat, moisture, and condensation were non-existent' (Church et al, 1986: 344). The more general use of compressed air over the period 1850-80 stimulated the design and development of commercial coal-cutters. These initiatives were invigorated with the introduction of electricity for power purposes from the 1880s.

Electricity was a more powerful motive force than compressed air. But its use introduced new safety hazards in coal mining. Between 1908 and 1914, there were seven major colliery disasters in the British industry, involving the loss of 1277 lives (Nelson, 1939: 559). Official clearance had been given to the use of electricity underground in 1905, following a Home Office investigation. In that year, a code of Special Regulations had been established to regulate the use of the new power supply. These regulations were updated in 1913, but thereafter remained in force substantially unaltered through the inter-war period. According to the official statistics, electricity caused a further 224 deaths in the industry between 1926 and 1936 - 'due to shock, fire, or the ignition of fire-damp' (Nelson, 1939: 605). The total number of lives lost as a result of accidents below-ground in mines governed by the Coal Mines Acts in these ten years was thus brought to 8,656.

Electricity steadily displaced compressed air as the motive power for coal-face machinery over the inter-war period, although compressed air continued to be used in those mines and districts where the emission of fire-damp reached such a level as to prohibit the use of electricity, and to drive coal-cutting machines of the percussive type. These machines differed in their design and action from rotary coal-cutters (bar, disc and chain). While the latter actually undercut the coal, percussive machines reproduced mechanically the action of the miner using a hand-pick for holing, and broke-up the coal through a series of rapid blows. Percussive machines were lightweight and portable and hence might be hand-held, or attached to a fixed column around which they were rotated. They were mainly used for 'heading' or 'narrow work' in bord and pillar workings, and to advance the loading roads with longwall mining. But they were less powerful

than machines of the rotary type, possessing an annual output capacity of 2,500 tons in comparison with the 11,000 tons of the disc-type of machines in use at the beginning of this century (Church et al, 1986: 349). Nevertheless, percussive machines accounted for 37 per cent (1,882) of the total 5,073 coal-cutting machines in use in the British industry in 1920; this proportion falling to 18 per cent (1398) of the total 7,729 machines in use by 1938 (1).

Three principal types of rotary coal-cutting machines were employed in the British industry; bar, disc and chain coal-cutters. These machines operated on the same general principle, combining a penetrative function with the turning action of sharp pointed tools or picks to undercut the seam. Each consisted of a cutting tool mounted on a moveable base, and in longwall workings the whole apparatus was hauled along at a steady pace (normally by rope haulage) to undercut the face (Shepherd and Withers, 1960: 29). While percussive drills might be hand-held and operated by the collier to get the coal before filling it into tubs, with the introduction of larger and heavier rotary coal-cutters the work was sub-divided and the new grade of machine operator created.

Lighter and more portable than machines of the disc-type, bar coal-cutters could be employed for longwall applications and for heading or narrow work. But these machines gave rise to mechanical and clearance difficulties and were outclassed by the disc-type in hard holings. The disc machine achieved an early popularity in the British industry, with the majority of the rotary coal-cutters in use in the period before 1913 of this type. Although stronger than the bar machine, the disc-type could only be used for longwall working, and to make a relatively shallow depth of undercut, while it was unsuitable where the floor was undulating, or

where the coal was liable to collapse onto the disc, thereby trapping it. These limitations proved increasingly restrictive with attempts to undercut to greater depths and, with the availability of an alternative, more productive design, colliery firms increasingly turned to machines of the chain type from the 1920s.

TABLE 5.1. PATTERN OF ROTARY COAL-CUTTERS IN USE IN BRITAIN, 1900-38

	Disc	Bar	Chain	Total
1900	160	16	4	180
1910	930	333	134	1397
1920	1254	700	1216	3170
1930	572	566	4132	5270
1938	140	186	6005	6331

(Anderson and Thorpe, 1967: 779; H.M. Inspector of Mines, Report, 1938)

The chain machine could be employed for longwall and for heading (or narrow) work. Its cutting tool consisted of a projecting arm or jib, carrying an endless chain armed with picks. Prototype chain coal-cutters had been developed in Britain from the 1860s although, as indicated above, their use was limited before the First World War. Early designs had proved unsatisfactory, with the chain liable to break under presssure or to be buried under the weight of coal. Mining companies and engineering firms involved in machine production had in turn concentrated on making improvements to the disc-type of coal-cutter.

In the United States, in contrast, machine manufacturers had concentrated almost exclusively on the chain design from the 1870s, developing it to a

high level of productive efficiency and adapting it 'to suit different conditions as they were encountered' (Reid Report, 1945: 40). From the early twentieth century, and with increasing success during the First World War, US machine manufacturers had attempted to penetrate the British market. Features of the chain machine, as developed in the US, now began to recommend it to British mining companies. With continuing improvements, the chain coal-cutter was established as the most popular type in this country by the 1920s; recognition of its 'overwhelming superiority' deriving from its greater increase in productivity over the period in comparison with the bar and disc types of coal-cutter (Evans and Fine, 1980: 10).

The early success of US machine manufacturing firms - in the development of the chain coal-cutter and in terms of their export performance - has been attributed to industrial organization in that country (Anderson and Thorpe, 1967; Shepherd and Withers, 1960; Hibberd, 1955). From the outset, the manufacture of coal-cutting equipment was organized as a specialist branch of engineering with a number of dominant firms soon emerging. These companies worked in collaboration with mining concerns. They employed specialist technical staff, with experience in coal mining, and laid out their works for the exclusive production of coal-cutting machinery. In Britain, in contrast, in the period before 1913, mining companies ordered machines to their particular specification from generalist engineering firms 'not necessarily connected with mining and whose concern began and ended with the construction of the machine' (Anderson and Thorpe, 1967: 779). While the limited size of the domestic market must obviously have inhibited specialization, the fragmented structure of production on the machine manufacturing side, with engineering firms building prototypes and 'one-offs', resulted not only in some peculiar end products, but also

relatively high unit costs. The experience of US competition during the First World War, however, prompted some reorganization, with a number of larger, specialized machine manufacturing firms emerging in Britain from the beginning of the inter-war period. Initially copying and developing US designs, firms such as Anderson and Boyes, Mavor and Coulson, and Diamond, thereafter developed links with mining companies and collaborated with mining engineers in product design and innovation. These firms were able to expand through the development of the domestic market and through exports, with the manufacture of mining equipment coming to represent an important sector of UK engineering. Nevertheless, the Technical Advisory Committee appointed by the Ministry of Fuel and Power (hereafter, the Reid Committee) could identify significant scope for economies through the standardization of coal-cutting machines and parts in its Report, published in 1945.

While British machine manufacturing firms concentrated on the production of chain coal-cutters for longwall applications in the inter-war period, their counterparts in the United States had developed this design principally for bord and pillar (or room and pillar as this system was known in North America) working. The room and pillar method was almost universally adopted in the US industry in the nineteenth century, or pre-mechnization, with geological conditions in that country tending to maintain its productivity advantage over the unmechanized longwall system. Seams were generally thicker (5½ foot on average), at a shallower distance from the surface and less faulted than those worked in Britain in the late nineteenth century (Anglo-American Council on Productivity, 1951: 29). Thereafter, the advantage of the room and pillar method was sustained with the development of machinery which made possible the 'rapid development of

headings, and the extraction of pillars soon after they had been formed' (Reid Report, 1945: 40). These were shortwall and arcwall coal-cutters.

The former performed a function somewhere between that of a longwall cutter and a heading machine, which is to say it 'cuts a short longwall face or a wide heading' (Shepherd and Withers, 1960: 86). Arcwall and shearing machines could be arranged to cut in planes other than the horizontal. They were principally chain-type coal-cutters, but adapted to operate head-on to the face. The arcwall was developed for cutting in the 'narrow' of room and pillar work. It cut a semi-circle with its jib, the machinery remaining stationary during this process, so that the width of the heading that could be cut from one position was limited. Such machines were only employed on a limited scale in the British coal industry, although they were adopted at some collieries in the inter-war period for driving the headings (or stables) at either end of longwall faces.

Face Conveyors

Mechanical coal-cutters displaced the hand-holing collier. The coal-cutting machines in use in the British industry at the beginning of this century could undercut at a rate some two to three times faster than the collier using a hand pick (Church et al, 1986: 348) and considerable improvements in machine capacity were made over the inter-war period (Royal Commission on Safety, 1938). But the coal had still to be blasted-off the face and filled, by hand, into tubs brought to the face by haulage workers. In order to attain the maximum utilization of machine capacity, therefore, various changes were introduced to accelerate the rate at which coal was 'cleared' and transported away from the face to the underground haulage routes.

Mechanical face conveyors, employed to transport the coal from the face to the gate- or loading-roads, were introduced in the British industry from the early twentieth century. Before the First World War, however, their practical application was limited with only 377 conveyors in use at the face in 1913. There were various models - shaker, scraper and belt-type conveyors - although these operated on the same general principle. The conveyor was erected in a track running along the length of a working face, and was driven by pulleys or rollers at the discharging end. Coal was shovelled onto it by the faceworkers, transported along the face and discharged into the gate-road or into tubs via a gate-end conveyor. The belt-type conveyor proved to be the most popular model, so that by the 1930s the 'classic longwall installation consisted of a chain machine and belt-type face conveyor on a single or double unit' (Anderson and Thorpe, 1967: 780).

Mining companies initially viewed the face conveyor as reinforcing and extending the advantages of the longwall method; reducing the number of gate-roads that had to be built to give access to and from the face and, with this, reducing the ratio of indirect to direct workers engaged at the face. In thin seams, in particular, worked on the longwall method, there was little space to push tubs along the face to the collier's working place. Gate-roads therefore had to be built at frequent intervals so that the output from the stalls could be filled into tubs and removed by haulage workers. With conveyors, however, 'instead of having a gate road to shoot in every 10 or 12 yards, you have a gate road perhaps every 180 yards' (Eight Hours Day Committee, 1907, Q. 17050). But while the costs of building and maintaining roadways might be reduced, it remained essential

to pack the goaf behind the advancing longwall face, and this work absorbed much material and 'unproductive' labour (Mavor, 1924: 1510-11).

Conveyors also served to increase the productivity of direct workers, or to increase the amount of productive labour time devoted to the operation of coal-filling. They reduced the amount of 'casting' or 'boxing' necessary, since the coal had no longer to be shovelled along the face to the gate-roads in thin seams. Moreover:

> .....the filler, instead of lifting the coals into a tub, has only to lift the coals into troughs - a maximum height of 18 in. This means that the output per filler per shift should be greatly increased: in the case of a seam 3 ft. thick, where fillers in the ordinary longwall method can fill six tons per shift, there is no reason why with conveyors the output should not be at least 10 tons per filling shift. For the same output, therefore, from a given face a reduction of 40 per cent. in the number of fillers can be effected. (*Colliery Guardian*, 1.1.1926:35)

Conveyors were adopted in some mines and districts where the coal continued to be undercut by hand. From the 1920s, however, mining engineers stressed that where the coal was cut by machinery, the installation of conveyors was essential to secure the maximum utilization of the coal-cutting equipment.

> The application of power to the conveying of coal at and in the vicinity of the coal face may be described as technically and economically essential to intensive machine mining in which the productive effort is concentrated and large outputs are obtained from comparatively small areas. That the difficulties of dealing with the output from coal cutters without any radical change in the methods of loading the coal and delivering it to the mechanical haulage are practically insuperable is becoming more widely recognised. (Mavor, 1926: 901-03)

Mechanical conveyors in conjunction with work reorganization at the face served to accelerate the rate at which coal could be 'cleared' and transported away from the face to the underground haulage routes. But the rate at which coal could be transported along secondary and primary haulage routes to the shaft might also act as a brake on productivity at the face and, in the British coal industry in the interwar period, the methods of transporting coal underground were primitive, having changed little from those considered to be 'best practice' in the late nineteenth century (Reid Report, 1945: 65). Haulage techniques in Britain and on the Continent are considered in the final section of this chapter.

THE SOCIAL REORGANIZATION OF PRODUCTION

Mechanization involved expenditure on coal-cutting machinery, power generation and its transmission below ground, and supporting equipment. With this increased capital outlay, firms claimed greater control over the use of their expensive investments, supplementing the 'rights of property' with the 'right to manage' (Melling, 1980:195). Mining engineers advised that the 'success' of coal-cutting machinery 'did not...altogether depend upon the number of yards cut on certain days, but on producing a constant and regular output' and that this could 'only be brought about by everthing being done systematically' (Royal Commission on Coal Supplies, 1901-05: 341). The machines had to be kept going at full capacity and their costs covered by a 'sufficiently' large increase in productivity. In other words, colliers could not be allowed to enjoy the benefits of machinery in the form of less back-breaking work. Rather, they had to be induced to put 'the same energy' (if not more) that they had formerly expended on hand-holing

into the work of 'breaking down and filling the coal away' (Simpson, 1921: 449). Towards this end, managements and their technical advisers experimented with new work arrangements at the face in the period to the early 1920s.

Longwall mining afforded the potential to maximize the machine time actually devoted to undercutting in a working shift, or to minimize the time lost in 'flitting' the machines from one short face (or pillar) across the roadways to another. With this priority, the size of the stalls in longwall workings was initially enlarged, although with the 'long face' system - employed at a number of mines where machines had been installed in the period before the First World War - the coal-cutters were used to undercut a number of such lengths of working face in sequence, and were still 'flitted from end to end of the face round the roads' (Ridsdale, 1925:21). Machine operators were paid by the yardage of face undercut and simply progressed along the face, undercutting the maximum length possible in their working shift. Machine operators worked on the same shift, or on one overlapping with the colliers who, in addition to filling the coal into tubs, might still be required to complete 'deadwork' tasks - timbering and packing the goaf.

But the long face system did not survive on any scale much beyond the mid-1920s. Aside from the machine time lost in 'flitting', the sub-division of the collier's work had created a 'perpetual problem of organisation' for management or, more accurately, for subordinate officials (*Colliery Guardian*, 31.8.1923:525). Colliers had constantly to be re-deployed along the face by the deputies and in accordance with the rate of progress of the machine operators. Any delay in 'clearing' the face brought the machines to

a standstill while if, as was often found in practice, 'the front end of the face is ready to be cut again before the machine has finished cutting at the far end' (Ridsdale, 1925:21), colliers were left 'under-employed' during their working shift.

By the early 1920s, mining engineers were emphasizing the distinction between mechanical coal-cutting and machine mining 'proper'. Typified by the long face system, mechanical coal-cutting represented the use of machinery 'merely as a makeshift or as a counterpoise to manual labour' (*Colliery Guardian*, 3.10.1924:882). With machine mining, in contrast, management addressed the process of coal-getting as a whole, constructing a 'co-ordinated system' in which the 'primary process' of undercutting 'was not dissociated from the ancillary services upon which the effective application of machinery at the coal face depends' (Mavor, 1924:1510). Defined as the 'application of machinery in systematic conformity with a pre-determined mining policy', machine mining in effect represented an extension of managerial control over the preparation and planning of work and over the use of the new technology, with this control employed to direct and increase the productive effect of labour.

The 'Unit System', or Intensive Machine Mining

For the industry's technical experts, machine mining meant the 'unit system'. By the early 1920s, they were reporting that it was 'beyond doubt' that the 'coal-cutters producing the largest outputs in relation to the thickness of the seam are those which are employed on the unit system and are "non-flitters" (*Colliery Guardian*, 31.8.1923:525). Later known as the 'longwall method' (Trist and Bamforth, 1951), or 'conventional machine mining' (Goldthorpe, 1959), the unit system had largely displaced the 'long

face' method by the mid-1920s, and thereafter became established as the dominant system of machine mining in the British industry in the interwar period. It involved the 'standardisation of method' and 'specialisation of labour' (Mavor, 1926:903), or the imposition of a more intensive division of labour at the coal face and creation of a large-scale production system, organized and directed by management.

In contrast with the long face method, management now planned 'every detail of the scheme of operation in advance' so that 'organisation is built up at the beginning once and for all' and, in theory at least, had thereafter 'only to be maintained on established lines' by subordinate officials (*Colliery Guardian*, 31.8.1923:525). The collier's 'complete job' was broken down into a series of narrowly-defined tasks. These tasks were arranged by management in rigid sequence over three separate shifts. Coal-cutting and coal-filling were organized on two separate shifts, with other preparatory and 'deadwork' tasks arranged on a third shift and so that 'work at a machine face (became) a twenty-four hour cycle of three operations in unending succession' (Manley, 1947:12). Within each shift, however, there was an increased division of labour and workers were confined to the performance of a single - or at least simplified - task.

The working face was divided into a series of 'units' (see figure 5.3 below), each one organized on similar principles and of such length that it could 'with certainty' be undercut by a single coal-cutting machine to a specified depth within the time limits of a single working shift. In this way, machine time was used more intensively with the elimination of the process of 'flitting', and a greater priority was given to the rate of advance of the face - or depth of cut - rather than simply to the length of face undercut. Machine time was used more intensively and labour was

arranged accordingly. In contrast with the long face method, each machine crew was now assigned a 'definitely specified task to be performed within specified limits of time and to be repeated at regular intervals', or once in every period of 24 hours. Similarly, all other tasks involved in the extraction of coal - drilling, shotfiring, filling out the coal, ripping the roadways, timbering and packing - were 'so organised that they too (could be) regularly completed in a given time', the face advanced each day a distance equal to the depth of the cut and a large output of coal regularly extracted from a relatively concentrated working area (*Colliery Guardian*, 31.8.1923:525).

A single face-unit would be between 100 and 120 yards in length, depending upon the thickness of the seam, with a three foot seam undercut to a depth of, perhaps, five foot.

> .....the coal-cutter allotted to the face cuts across it every day during one cutting shift, all other work being arranged accordingly so that the face advances one complete cut per 24 hours, and the output per day from each unit only varies within very narrow limits. Conveyors may or may not be in use, but each machine is responsible for its individual face, which must be only of such length that it can be cut within the time allotted to cutting...(Ibid)

A double face-unit was 'a pair of such faces in line to right and left of a central loading road to which the output of both faces is delivered'. The length and depth of the cut established the volume of coal to be extracted from each face-unit each day. In the case of a double face-unit, this might be 200 to 250 tons. To obtain this output, however, effort had to be 'concentrated'; labour organized into large work collectivities and brought to work with the strength and regularity of machinery.

Figure 5.1. Hand-got, Pillar and Stall Layout

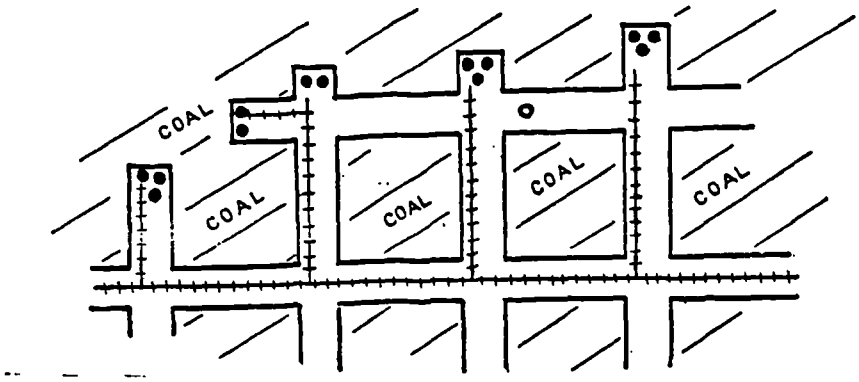


Figure 5.2. Hand-got, Longwall Advancing

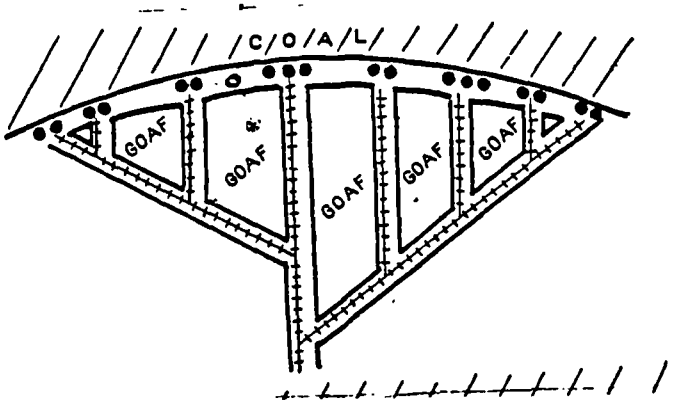
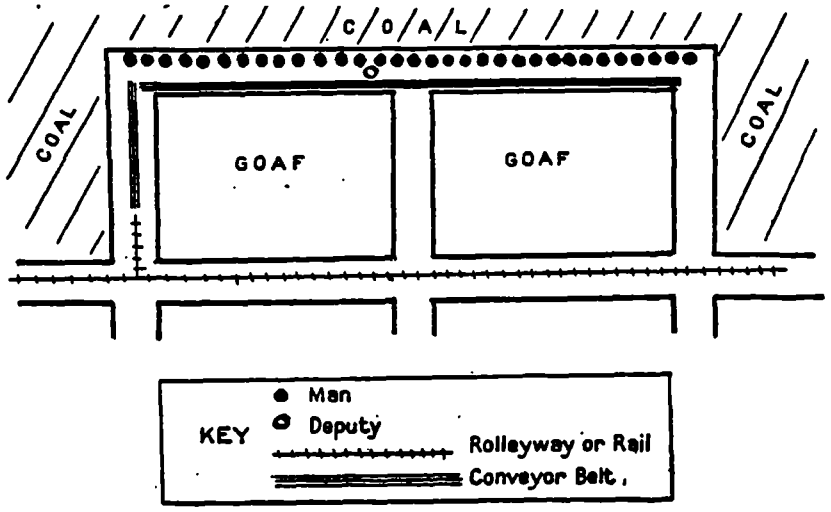


Figure 5.3. Partially-Mechanized, Longwall Advancing



(Source: Goldthorpe, 1959)

In place of the collier and his assistant, or small coalface work team of hand coal-getting, a 'cycle group' was created as the basic production unit within the mine. Some 40 to 50 workers might be employed at a double face-unit, or whatever complement would ensure that each task was completed to time and each man kept 'fully employed' during his working shift. The members of the 'cycle group' were divided by time - working on three separate shifts in the 24 hour period - - and by task, with an array of specialized jobs created from the collier's craft job and performed in accordance with management's 'pre-arranged timetable'.

The 24 hour cycle of operations commenced with the cutting shift, which was usually performed at night. A machine crew would comprise four men, each of whom had his own, narrowly-defined task to execute. The first man worked in advance of the coal-cutting machine, taking out the timber props supporting the face to allow the machine to pass. The second man (or 'the cutter') steered the machine, and had to ensure that an even cut was made along the lenghth of the face. The third followed behind to clear the 'gummings', or coal left between the undercut and the floor, and the fourth re-set the timber props. Machine men were exposed to fresh health hazards in their work since the operation of the coal-cutter created a 'fantastic din' and filled the confined space at the face with 'a dense cloud of black dust' (Manley, 1947:12).

The machine crew was followed by the 'belt-men' who also worked on the night shift and whose job was to move the face conveyor out of its old track and into a new position alongside the freshly-cut face. Up to four men would be employed on this work; two on belt-breaking and two on belt-building. The work was physically demanding and awkward. The belt ran in a metal trough which had to be dismantled into sections and reconstructed on

the other side of the timber props supporting the face. Set at intervals of a yard, these props formed a 'thick forest of obstruction' (Ibid).

At the start of the morning shift, the borers came on to drill holes at ten yard intervals along the face, just below the roof, in preparation for the shotfirer. The shots were fired singly, bringing down the coal at particular spots, thereby making it easier for the colliers to 'break into' the face. The bulk of faceworkers were now confined to filling the coal, with the 'fillers' representing some 50 per cent of the complement of the 'cycle group'. This work was performed on the morning shift. Twenty men would be employed on a double face-unit; ten on each half-length of face. A common practice was for this length to be divided again so that each man had an equal portion of face (8 to 10 yards) to 'clear' in his shift. The fillers had to extract the coal from this length of face, going back to the depth of the cut. They used a hand pick (or in some districts, a pneumatic pick), to break into the coal and a shovel to load it onto the moving conveyor belt. In some districts, the fillers were still required to set props to secure each yard of face that had been 'cleared'. Their work was arduous and monotonous and in thin seams had to be performed in a crouching position. In contrast with hand coal-getting, *fillers on a mechanized face* worked under more intensive managerial surveillance since it was vital for the face to be completely cleared of coal in the filling shift if the machine operators were to begin their work promptly at the start of the next cycle of operations (see below).

While the fillers were at work, other grades performed a variety of ancillary tasks. Conveyor attendants kept the belts working and ensured that the coal passed from the face, via the gate-conveyor, to the tubs. Men at the loading end in the gate roads moved the empty tubs into position and

off again after they had been filled from the gate-conveyor. Others were in charge of the putter engine which drove the conveyor belt. Haulage workers moved the tubs to and from the main haulage routes. These different operations were going on as 'part of the business of coal extraction while the colliers are at work at the face; they are units in a human machine which dovetails in with the mechanical contrivances to form one integrated whole' (Manley, 1947:16).

On the third or afternoon shift, the rippers came on to extend and pack the gate roads in line with the advance of the face. Prior to the introduction of coal face machinery, this operation would have been performed by a separate group of workers, normally on a separate shift, and the work was little changed by the new arrangements at the face. It remained a 'complete job in itself, seen by the group within the compass of one shift' (Trist and Bamforth, 1951:17). The rippers were followed by the timber-drawers whose 'business is to withdraw all the back timber; that is, to get the props and chocks which have been left supporting the roof as the face has moved forward' (Manley, 1947:16). The chocks were arranged in a double row behind the conveyor. The timber-drawer removed the back row first and built a new row just behind the conveyor track. The work was dangerous - 'infinitely more so than in a hand-getting section' (Ibid) - since with the increase in the length of the working face, there was a tremendous weight bearing down on the props. Assuming that the operation was completed successfully, however, the face was prepared for the cutting shift to begin again and commence the cycle of operations following in its wake.

Skills, Autonomy, and the Intensification of Work

The introduction of coal-face machinery and increased division of labour under the unit system effectively de-skilled the collier, undermined his autonomy and control over work. This at least has been the verdict of most academic commentators (eg Goldthorpe,1959; Daunton,1981; Burns et al,1983; Campbell, 1984). In the interwar years, mining engineers and other interested parties were also quick to point out that mechanization 'almost invariably produced a degradation of skill' (Gemmell, 1921:1607); that it was displacing the 'skilled hewer as an important grade of labour' in the coal industry (Hilton et al, 1935:44); and that in mining, 'as indeed in every industry, mechanisation tends to negative craftsmanship' (Fox-Allin, 1949:107).

More recently, however, Penn and Simpson have offered an alternative interpretation. They argue that a 'whole array of specialised skilled jobs were created out of the traditional craft job of the collier' and that, while 'the collier may have lost some of his skills in terms of his traditional role, it would appear that overall more skills were required in the new system' (1986:343-4). This is a curious conclusion. Penn and Simpson attempt to evaluate the skills demanded by the new, specialized job roles. But they could perhaps be criticized for failing to address the central issues of job autonomy, and structure of control within the labour process.

Certainly new grades of underground labour were created with machine mining, and some new skills were required in production. Mechanical and electrical fitters were required to maintain the coal-face machinery, supporting equipment and power supply. But maintenance workers formed a

small proportion of the total employed at or in the vicinity of the face. Hence, in summarizing the changes in the composition of coal mining employment brought about by mechanization, the Royal Commission on Safety reported in 1938 that:

> ....instead of the general skilled craftsman of the past, who might properly be described as "the complete collier" there are to-day broadly two kinds of colliery workers at the face - (i) mechanics and the like semi-specialized colliery craftsmen and, (ii) a substantial proportion of workmen who, highly adept though many of them are, are primarily manual labourers. (Report, 1938:46).

An array of specialized jobs were created from the collier's traditional craft job, including that of machine operator or 'cutter'. Penn and Simpson argue that this was a 'skilled and often dangerous job' (p.343). Other writers have agreed that to guide the cutting-machine and ensure an even undercut required 'rather more "engineering" skill than other coal-face tasks'. But the contrast was drawn with tasks such as belt-breaking, belt-building, and filling which principally demanded an input of physical effort (Trist and Bamforth, 1951:16). And mining engineers in the interwar period contrasted the 'craft knowledge' and 'special skill' of the 'complete collier' with the 'limited capability required for driving coal-cutters' (Nicholls, 1944-5:288), emphasizing as one of the advantages of machine mining the fact that the 'machine man could be more quickly trained than the hand hewer' (Simpson, 1921:450).

Mining engineers advised that 'too much stress cannot be laid on the value of a well-trained crew of attendants for each machine'. But they were to a large extent concerned that machine operators should acquire the behavioural skills of cooperation and obedience, arguing that 'their

training should be something like that of a well-drilled gun squad, each man practised in his own special duties and working in full conjunction with the other' (Bulman, 1921:1659-60). This concern followed from the creation of a large-scale and more integrated production process involving the use of expensive equipment and groups of specialized and interdependent workers. Under the unit system, a definite length of face had to be undercut to a specified depth in the time allotted to cutting if succeeding shifts were not to be held-up and the 24 hour cycle of operations disrupted.

Prior to the introduction of machinery and the unit system of machine mining, the 'complete collier' worked in a self-contained stall or working place at the face. With his helper, or assistants, he performed the entire operation of coal-getting (and, possibly, all 'deadwork' tasks); cutting, ripping and filling the coal out in the same coaling shift. Certainly the degree of technical, or 'genuine' skill (Burgess, 1983:5) required varied - as, for example, with the hardness or degree of faulting of the coal seams. And the collier's skill was in part socially constructed, through the rules and regulations governing access to piecework employment at the face (see chapter three). But the collier (or work group) performed a complex set of operations under variable geological conditions, and his piecework earnings were dependent upon his skill, dexterity and also his physical strength. And it was in large measure because of the nature of coalface work that managements were unable to prescribe tasks in detail or closely monitor the performance of work, although of course other relevant factors included the physical conditions in which mining took place and job controls imposed by faceworkers to prohibit interference from pit officials.

Of course, the autonomy enjoyed by the collier was not inviolable, and was neither uniform between different coalfields nor over time (see chapter three). A significant proportion of faceworkers, moreover, had been subject to direction from the butty-man, collier, or senior member of the work group (see chapter four). The transition from bord and pillar to longwall mining had brought certain changes, although the colliers retained considerable autonomy - determining how best to work the face, in which sequence to perform the various tasks involved - while day-wage men worked in a group which took (or in which some members took) these decisions and retained immediate control over the pace of work.

With machine mining under the unit system, in contrast, the working face was treated as an undifferentiated 'production unit'. Colliers lost their control of an individual working place; they 'no longer work in isolation, but are grouped' (Mavor,1924:1510). The work was sub-divided - into discrete tasks performed on separate and consecutive shifts - so that management alone could view the labour process as a whole.

> .....the getting of coal by hand, with all the cutting, shovelling, ripping, packing, drawing off, etc., was a craft, an art, while now all the jobs are specialised and have become monotonous. There are cutters, who are cutting the coal-face by machine, and borers, and shot-firers, and fillers, and beltmen or pan-turners, etc. The collier of to-day in a mechanised colliery is doing practically nothing but shovelling - shovelling all the time...(Zweig,1948:21)

Penn and Simpson might object that such an account underestimates the 'skills and complexities of underground work'; that the job of filling (to which the bulk of faceworkers were now confined) entailed 'much more than shovelling coal "per se"'; that while it demanded physical strength, it

also demanded experience of geological conditions to be performed effectivly and with safety (p.343). But experience and skill are not the same thing. Experience may produce dexterity in task performance and provide some safeguard for workers performing routine jobs in hazardous conditions. Skill, on the other hand, usually denotes versatile competence and job autonomy, with the latter a function of the worker's control over the conceptual aspects of production.

The craftsman collier possessed a 'wealth of native knowledge', and mining engineers were often effusive in their praise of his multifarious capabilities. But they also argued that the 'trouble is that such a workman too often does not fit into the 'chain' (Greenwell,1933:302), because he performed a complex set of tasks under variable conditions, retained immediate control over work and the scope to act on his own inititiative in production, determining the pace at which he worked during his shift. Through the division of the collier's 'complete task' into a series of discrete and simplified jobs, management enhanced its control over labour. The content of the specialized job roles could be defined with greater precision; workers instructed as to what they should - or not - be doing in their working shift. Mavor, the machine manufacturer, described the benefits (to management) of the unit system in this way. He argued that the detailed division of labour closed the gap between mining operations and 'the work carried on in factories and workshops', and noted the potential which it gave for raising the intensity of labour.

> .....the special difficulties and vicissitudes to which mining is subject are mostly amenable to a considerable degree of control by methods appropriate to the conditions. Intensive mining facilitates control of the physical conditions and further it facilitates control and increases

> the productive effect of labour. Intensive mining on the unit system implies a considerable amount of standardisation of method, a daily cycle of operations at each unit of coal face is established and several clearly defined operations are repeated in the same sequence day after day by men whose labour is specialised, and the work becomes comparable with some repetitive processes in workshops. These conditions render practicable the application to mining organisation and operations of the principles that in recent years have so greatly increased the productivity of labour in other industries - notably in engineering. (1926:903)

Eroding the collier's control over work, job fragmentation and redesign - elements of the classic 'Taylorist' approach to work reorganization - were significant because they formed the basis for the intensification of labour. That is to say, the 'porosity' of the working day could be reduced by re-allocating to labour simplified tasks, parts of the complete operation of winning the coal. Workers had no longer to prepare the work or switch between different tasks in its execution. Hence periods of 'unproductive' labour time could be minimized as managements attempted to impose new, and exacting work schedules at the face.

Of course, the substitution of machinery for undercutting and increased division of labour under the unit system (with the separation of preparatory and production tasks) did not eradicate the potential for worker resistance to intensification. But there again, labour market conditions in the interwar years bolstered management's advantage in this process and mineworkers, their representatives - and many colliery officials - reported that with mechanization the work had been 'speeded-up'.

> It is often thought that the development of mechanized mining has lightened the physical burdens of the miner,

> and it is true that to-day mechanical coal-cutters and conveyors do much of the heavy work which was formerly done by manual labour. But in mining, as in other industries, the machines are employed to the best advantage only when they are working at full capacity and without stopping; the men have to keep pace with the machines and consequently there has been a great speeding-up of the work and an increased strain on the men. Imagine a coal-cutting machine and a conveyor underground. The machine cuts the coal at lightning speed and the conveyor brings it out to the waggons in an endless stream; to feed the conveyor adequately the men have to work at the highest possible pressure and without a moment's respite. This is a big strain on their nerves, which is increased by the noise in which the work is done... (Jones, 1936:21)

The division of labour alone could not ensure labour's compliance with new effort standards at the face. Yet by virtue of the interdependence of the specialized job roles in the unit or cycle system it became essential that workers did comply with management's pre-determined work schedule and complete their allotted tasks to time. Hence, while with hand coal-getting the 'rate of production was to some extent a matter for the individual miner', with machine mining there 'developed the need for closer supervision of the rate and amount of work done' (Royal Commission on Safety, 1938:183).

Firms had to develop the function of supervision, deploying staff to maintain a new discipline at the face and ensure that tasks were completed promptly. This was an assault on the collier's 'independence' and one which was bitterly resented. The craftsman collier, who to an extent had been 'his own master' in his stall or working place, now found himself subordinatated as 'a cog in the machine' (Greenwell, 1933:302); a 'link in

a chain of producers and must conform to the routine of the mine' (Mitchell, 1933:78); a 'partner in a team which is usually big, of twenty or thirty or even one hundred men, who must collectively clear the face by a given time, so that the belt can be turned and moved forward, towards the receding face' (Zweig, 1948:22).

Supervision and Payment Systems

The Royal Commission on Safety reported in 1938 that mechanization had created the need for a 'far more intensive and continuous supervision over the progress of work in each district than was required in hand mining' (Report:48). Mining engineers stressed the same point and in the interwar years urged that 'outputs, such as thoroughly justify the use of mechanical conveyors, can be obtained only by the most carefully thought-out organization and skilled and constant supervision' (Clive, 1929-30:311; see also Mavor, 1924; Barraclough, 1927-8; Newey, 1929-30; Tyson, 1930).

Mechanization and the unit or cycle system of machine mining created a two-fold need for supervision; in terms of both the coordination of the production process and the control - or surveillance and coercion - of labour. The collier's 'complete task' had been fragmented into a series of narrowly-defined tasks arranged in rigid sequence over three separate shifts. Labour was specialized, with workers confined to the performance of a discrete part of the process of coal extraction, and it now fell to management to integrate these interdependent tasks and shifts into a coordinated system. The cycle system of production also 'developed the need' for closer supervision of the performance and pace of work at the face.

With hand coal-getting, the collier worked in a self-contained stall or place and bore the consequences of any delay in his work in the form of reduced earnings. Other coal-getters would be little affected, working in their self-contained stall or working place. But mechanization involved a 'regular cycle of intensive operations', with 40 to 50 workers and the mine owner's expensive coal face equipment deployed at each unit-face. While a 'well-organised machine face set a definite pace of the cycle of operations that must follow in its sequence' (Colliery Guardian, 9.2.1923:346), equally it demanded the 'rigid adherence to timetable' (Moonie, 1936-7:247). Tasks and shifts were interdependent, no shift could begin until work on the preceding one had been completed, and the creation of this large-scale, differentiated and rigidly-sequenced work system had created the potential for large-scale disruption and failure in production (Trist and Bamforth,1951). Workers on each shift had an allotted task which they had to complete in a specified time, and delays on any one shift could have a knock-on effect through the cycle as a whole, rendering men and machinery on succeeding shifts 'idle' with, possibly, the loss of a day's output of 200 to 250 tons.

The cycle system involved tight work schedules and new output norms. Interwar commentators reported that it had forced mineowners to abandon their old 'laissez faire' attitude to labour management and to 'operate their mines by means of factory methods'.

> Machinery...does not permit of leisure on the job itself, for almost the whole merit of a conveyor system, in either a factory or a mine, is that it connotes a constantly moving cycle with which the human element must comply. (Greenwell, 1933:303)

Managements were attempting to simulate a 'conveyor system' or assembly-line, and workers had to be brought to comply with the new work rhythmns which meant an attack on job controls, the erosion of the collier's former autonomy, and imposition of a new, managerially-inspired work discipline. In part this involved the introduction of new rules and regulations concerning, for example, attendance and penalties for absenteeism. It also implied an increase in direct supervision at the face and coercion. Colliers had to be brought to commence work promptly at the start of their shift, complete their 'allotted work to time-table', with any 'lagging behind at once corrected' (Newey, 1929-30:384). Management now determined when the men could rest and take a break for their 'snap', and when they had completed their 'stint', so that as Mitchell (1933:77) described it, on the filling shift there could be 'no quitting of the job so long as the conveyor can gobble up more coal'.

Machine mining created the need for greater supervision in the form of coercion, and many writers have suggested that the colliery deputy - as first-line supervisor - was cast in the role of 'agent of change' in this process, and was charged with the responsibility for imposing and maintaining the new work discipline at the face (eg Goldthorpe, 1959:219). The changes in the deputies' role and responsibilities over the interwar period are considered in detail in chapter six. It is pertinent to note here, however, that the Coal Mines Act of 1911 restricted the part that deputies could (legally) play in coercion, since it charged them with certain defined responsiblities for safety in the mines, and 'in general debarred (them) from doing anything else except such shot-firing and measurement of work as will not interfere with the thorough performance of their safety duties' (Royal Commission on Safety, Report, 1938:48).

In practice, of course, the statute might only be 'honoured in the breach', as the Secretary at the Mines Department argued in 1936 (Royal Commission on Safety, Evidence:7, Q33). And to circumvent the legislative constraints there had also been 'a tendency in mechanized mines to appoint officials, without safety duties, to look after production' (Royal Commission on Safety, Report:183). These were the colliery overmen who occupied a position in the managerial hierarchy between the manager (or under-manager) and the deputy. Throughout the inter-war period, the qualifications for this position and the duties involved remained undefined in the legislation regulating safety standards in the mines. This meant that overmen could be employed exclusively 'on production' and, by virtue of their rank, override considerations of safety in the interests of output.

The increase in supervision brought about with mechanization is stressed in the literature of the interwar period - in official enquiries and reports, trade and technical journals, and in the commentaries of working miners and ex-miners (on the latter, see Field, 1981). But it is not actually expressed in the available statistics on the number of officials employed below ground. Between 1913 and 1924, there was a small increase in the number of deputies and overmen employed, and of these officials as a proportion of the total underground labour force (from 3.5% to 4%, Royal Commission on Safety,Report:51). But these figures relate to the industry as a whole and since less than 25 per cent of British coal output was cut mechanically in 1924, this suggests a general increase across mechanized and unmechanized mines and prompted by safety legislation (with deputies increasing from 2.8 to 3.1% of the total underground in this period) as

well as by changes in managerial practice. Supple presents figures for the period 1921-31, calculated from the annual Censuses, which indicate that:

> ...while the proportion of miners who were returned as 'subordinate superintending staff' rose from 5.1 to 5.3 per cent in Nottinghamshire, it was stable at 5.1 per cent in Northumberland and actually fell in every other major district (most strikingly in Glamorgan and Monmouthshire - from 3.3 and 3.5 to 2.7 and 3.0 per cent). (1987:441)

But the data are at least consistent with the claim made by many mining engineers that while mechanization 'necessitates closer supervision than on hand-worked faces,... owing to the concentration of output such close supervision can be effected at a reduced cost per ton' (Barraclough, 1927-8:194; see also Mavor, 1924). Faceworkers formed a declining proportion of the total underground labour force in the industry as a whole over the interwar period, and in mechanized mines they were also more concentrated within the mine, or grouped along a continuous length of working face, which facilitated direct supervision - at least in comparison with hand-working. And the increase in supervision might be expressed more in the changed role of underground officials than in the actual numbers employed, which would of course imply that the deputies were unable to perform their statutory safety duties (see chapter six).

Nethertheless, underground conditions still prohibited the continuity of surveillance that might have been feasible in a factory, while even in the latter the cost-effectiveness of constant and uninterrupted supervision had to be set against the expense of employing large numbers of supervisory staff. Mineowners in general displayed a reluctance to adopt any measure that would add to their overheads, and it is likely that practices varied

between firms. Newey reported that at pits in his charge, 'we have a deputy and a shot-firer on each getting shift and a deputy on the afternoon or repair shift, whilst each of the two main districts has an overman on all three shifts' (1929-30:384). But such arrangements may not have been universal.

Constant and uninterrupted supervision could not be maintained even in the best-staffed mines, however, while workers were unlikely to be persuaded to comply with the new rhythms of production without some sort of 'positive' incentive. Firms continued to rely heavily on the piecework payment system, although arrangements had to be modified with the transition from hand coal-getting to machine mining. With the former, colliers were paid according to the rates for particular jobs stipulated in the composite piecework price lists (see chapter three), and their payment might include the day-rate of their helper or assistant. With the introduction of machinery and sub-division of the work, price lists were disaggregated as piecework was extended so that most of the new job roles (and a far higher proportion of faceworkers) were paid on some sort of output-related wage incentive scheme.

> ....even though we were all so interdependent, each operation was still separate, and paid for on a separate contract - the colliers for so much coal filled, the cutters for so much coal cut, the borers for so many holes bored, and the packers for so many yards packed and waste removed. (Gormley, 1982:28)

New patterns of differentiation were therefore nurtured under the unit or cycle system of production, in spite of the sub-division and 'homogenization' of labour.

Technical innovation and work reorganization at the face occasioned the revision of piecework price lists and bargaining groups. For some

commentators - and notably Sam Mavor, who was no doubt influenced by his knowledge of developments in the engineering sector - work reorganization also offered firms the opportunity to establish rate-setting on a more 'scientific' basis. Mavor argued that the standardization of work and routinization of jobs made it possible for firms to apply work-study techniques. In this way, they would be able to establish the parameters of a 'standard day's work in each operation concerned in the cycle' rather than allowing such standards to be determined through 'guesswork' - that is, through the process of bargaining between management and men (1924: 1510-11). Mavor envisaged the introduction of some sort of premium bonus scheme. Workers would be paid a basis wage if they achieved the 'standard job time' and a bonus for 'performance in excess', with bonus rates for the additional output (or effort) already prescribed through the work study exercise.

Other mining engineers displayed an interest in work study techniques (for example, Moss, 1935-6; Barraclough, 1927-8). They argued that such techniques could be used to reduce job times and accelerate the flow of work to and from the face. But colliery companies in practice displayed little commitment to reducing the delays that were caused by ineffective methods of underground haualage, or to raising 'productive' labour time by investing in underground transport facilities for mineworkers who often had to walk long distances to reach their working place at the face (see below). In mechanized mines, the piecework payment systems that were introduced were rather less elaborate than those proposed by Mavor, and continued to relate output and earnings directly. And whatever 'scientific' principles managements applied to the process of rate-fixing, it remained within the scope of collective bargaining with managers and workers

pitching their respective, 'subjective' judgements on the contours of a 'standard day's work'.

Mineowners frequently complained that the colliers brought their old 'habits' to the process of rate-fixing in mechanized mines, and tried to 'keep down the standard output' when machines were under trial (*Colliery Guardian*, 2.10.1925:806). They complained that the men tried to maintain the 'old rates' under the new conditions (or attempted to maintain their earnings and/or secure some share of the productivity gains), and argued that piece-rate reductions were justified since the higher output obtained was due to their investment in coal-face machinery (*Colliery Guardian*, 15.2.1924:413). Certainly the revision of piece-rates with the introduction of machinery formed the focus of disputes, with owners attempting to reduce rates and/or intensify work and colliers attempting to prevent overwork or secure some share of the productivity gains in the form of higher earnings. But work reorganization gave managements something of an advantage in this process, since many workers were thrust into new job roles for which there were no 'customary' effort standards.

> The difficulty in some districts of fixing new contract rates for machine-mined coal can be appreciated to some extent, for in most cases the men have but a faint idea of the output they can produce under the new conditions until a trial has been made. Even then, it is a fact that.....the results obtained until all the men become proficient at their new work are often far from good, and the men look with apprehension on the new figures suggested. (Newey, 1929-30:385)

In the late 1920s and 1930s, mass unemployment in the coalfields and weakened labour organization tipped the balance more obviously in the employers' favour.

If conflict occurred over the revision of piece-rates, a more intractable problem for employers lay in determining the form of piece-rate scheme to be applied in the case of men hand-loading coal onto mechanical conveyors. In mechanized mines, the bulk of the coalface labour force was employed on the filling shift. The work was physically demanding and monotonous, and was often performed in very cramped conditions. The face had to be 'cleared' by the end of the shift if subsequent operations were not to be delayed, while work on the filling shift was often impeded by the breakdown of the conveyor belt. Often a tonnage payment was established. The output from each face-unit would be wound to the surface and weighed, and the earnings divided equally between the gang of 20 to 30 men - basically an 'all-throw-in' arrangement. But this could be the basis of tension where the men (or a proportion of them) had formerly been employed as colliers and paid on an individual piecework system, and there was a more obvious conflict between management and workers over the 'stint' or amount of work to be completed during the shift.

The problem for employers was one of motivating workers to work hard at an arduous and essentially routine job. Mining engineers suggested the value of cultivating a 'team spirit' on conveyor faces, so that men would be 'positively motivated' to work hard and reach - or surpass - management's output targets. The proposed means of achieving such a state of affairs included the 'careful selection of sets of men' (Tyson, 1930:2068); careful selection of officials, with men 'chosen who can instil and maintain the team spirit in the men under their charge' (Barraclough, 1927-8:194); and, in the spirit of the 'human relations in industry' movement, acceptance of 'self-discipline' on the part of management, who should be 'willing to listen to any grievance of the men, and, should this

prove legitimate, take immediate steps to rectify it' (Newey, 1929-30:385). But managers often professed to be baffled by what they described as the 'psychology of group work', and complained that on conveyor faces 'the productive effort is too often reduced to the level of the less energetic members of the group'.

> A few would think they were doing all the work, and, on the whole there would be evidence of distrust, jealousy and lack of efficiency. The average efficiency of the workers would, sooner or later, naturally rate itself to that of the most inefficient man in the stall. This might result in a demand for a higher getting rate or trouble with the union, due to men not making wages. (Wightman, 1933:495-6)

Such behaviour, of course, might be taken as evidence of a 'team spirit'; the collective imposition of effort controls by the fillers in an attempt to prohibit overwork. But it was clearly not the kind of 'team spirit' demanded by management, and hence in an attempt to stimulate work effort (by exciting competition between the men), some firms switched to a yardage payment, with each filler paid according to the number of yards of face which he had stripped in his working shift. This might be effective, insofar as it induced workers to clear as many yards as possible. But some managers complained that 'unless strict supervision was exercised, some of the coal might be flung in the gob instead of on to the conveyor' (Ibid).

With either a yardage or a tonnage payment, however, piecework tended to be transformed into a flat-rate system under the cycle system of production. This was because the work of the different shifts had to be 'balanced' in order to maintain the continuity of the cycle of operations as a whole (Zweig, 1948:78). The ability of employers to enforce a particular definition of the 'stint' (for particular tasks and for the

unit-face as a whole) and to raise it with improvements in machine capacity, was no doubt enhanced in the interwar years - and from the period after 1926 in particular - by conditions in the external labour market, low wage-rates and weakened labour organization at pit level. A third of the industry's workforce was unemployed in the early 1930s, and while employer practices did vary, firms could always eschew a more sophisticated approach to labour management and fall back on the threat of dismissal.

> "There are two sorts of discipline. One which was in in practice in the old days, based on the fact that two men waited for one job. If a man dared to open his mouth in criticism of anything in the pit, he was told briefly and simply, 'Get out', and in the pit-bottom itself there were men already waiting and eager to replace him". (Overman, interviewed by Zweig, 1948:16)

Unemployment in the coalfields buttressed managerial authority in production. At the same time, it contributed to the downward pressure on wage rates and thus formed the context in which unmechanized mines could remain in competition. With persistent surplus capacity in the late 1920s and 1930s, short-time working was prevalent in the coal industry. Many mechanized mines were unable to operate at capacity. Hence, while managements may have been able to secure the intensification of labour, with individual faces kept employed at full capacity, overall productivity would have been affected as workers elsewhere in the pit were laid off, and expensive coal-cutting equipment left under-utilized.

In 1913, 8 per cent of British coal output was cut mechanically. By 1927 the proportion had risen, but to just 23 per cent. Within the British industry there were marked regional (and intra-regional) variations in the pace of mechanization. Scotland established an early lead. In 1913, 22 per cent of Scottish coal output was cut mechanically and by 1927 the proportion had risen to 56 per cent. While the pace of mechanization varied across the Scottish coalfields, Northumberland was the only English district that could rival the Scottish total in 1927. In that year, 42 per cent of Northumberland's output was got with the use of coal-face machinery. Production in Scotland and Northumberland was oriented towards the export trade, but this was also the case for Durham and South Wales. In Durham, which accounted for approximately 70 per cent of output in the North East, only 18 per cent of production was cut mechanically in 1927, and in South Wales the figure was a mere 7 per cent. In Lancashire and Cheshire, South Yorkshire, and Nottinghamshire - districts principally oriented towards inland UK markets - the proportion of output cut mechanically in 1927 was 16, 11, and 22 per cent respectively.

In the British coal industry in 1927, hand coal-getting remained the predominant method of coal extraction in all but the Scottish coalfields. The position was rather different on the Continent. In the Ruhr, which accounted for the vast bulk of Germany's coal output, 66 per cent of production was won mechanically in 1926. By the end of the 1920s the proportion had risen to over 90 per cent, and in the Belgian coal industry

had reached 89 per cent (PEP, 1936:154). Even at the end of the interwar period, 40 per cent of British coal output was undercut manually.

Students of the British coal industry have discussed its failure to keep abreast with international competitors in the application of new extractive technologies in terms of poor entrepreneurial performance, and in terms of worker resistance to innovation. Chapter two looked at the principal positions in the debate on entrepreneurial performance in interwar British coalmining, and suggested that these explanations for the industry's decline were not entirely convincing. Analyses attributing the industry's technical backwardness to labour militancy and worker resistance to change can also be located within broader theoretical perspectives on the nature of the firm and operation of the capitalist economy.

Burns et al (1984), for example, adopt an orthodox labour process perspective; that is to say, one over-emphasizing the capital-labour relation. They argue that while new techniques of coal extraction had long been available to British mineowners, their 'diffusion and more intensive application throughout the industry occurred during the period after the General Strike when the miners were weakest' (1984:8). There is, however, little evidence to support this assertion, and in this section it will be argued that the defeat of the miners in 1926 had deleterious implications for the reorganization and modernization of the interwar coal industry. The mineowners' collective position and interventions in their struggles with the mineworkers will be related to the extreme diversity in the conditions of production across the industry. This diversity reflected the interplay of geological and market conditions, the uneven effects of the royalty system (see chapter two), and the outcome of struggles between employers

and workers which developed unevenly between and within the different coalfields.

Regional Differences

Scotland established an early lead in the application of mechanical coal-cutters. By 1910, 14 per cent of Scottish output was cut mechanically and the figure was higher for Lanarkshire, the largest of the Scottish coalfields (Campbell, 1984). Scotland exported approximately 30 per cent of its coal output and faced intensifying international competition from the early twentieth century. But thicker seams in the Scottish coalfields were nearing exhaustion, and the working of thinner seams meant deteriorating labour productivity and rising labour costs in the absence of technical innovation. With the working of thinner seams, longwall mining had been adopted more widely in the Scottish coalfields. And in evidence to the Royal Commission on Coal Supplies (1901-05), mining engineers reported that for many companies mechanical coal-cutting had now become an 'absolute necessity' (ev. George Gibb:335).

Campbell (1984) has looked at union responses to mechanization in Lanarkshire in the period before the First World War. Union officials identified a number of interrelated problems: the danger that employers would substitute cheaper, unskilled labour for the skilled hewers currently employed at the face; the new safety hazards created by the use of machinery and increased use of electricity below ground in the mines; the dangers of overwork, since some employers were attempting to enforce a ten-hour day for machine men (prior to the legislation of 1908), with obvious implications for those men and boys employed on filling. Acknowledging that mechanization created new problems and exacerbated existing threats to

jobs, earnings, and safety, the Lanarkshire Miners' Union nevertheless 'accepted it as the only competitive way of exploiting the declining coalfield's remaining thin seams' (Campbell:41).

There were numerous disputes across the coalfield connected with the introduction of machinery. But these focused on the revision of shift rates, with the men attempting to enforce union policy and ensure that basis rates were not reduced with the reorganization of production. Such disputes therefore represented the 'negotiated acceptance of machinery by the miners and their union' (Ibid). And mining engineers reported that where employers had been able to get 'better rates' for hand-holing, they had been able to temporarily evade investment in coal-cutting machinery (Royal Commission on Coal Supplies: 335). Union officials in Lanarkshire were anxious to avert rate-cutting with the introduction of machinery, and thereby protect jobs and earnings for skilled hewers. But they were also aware that many of the problems created with the introduction of coal-face machinery could be addressed only through industry-wide action - as, for example, to secure protective safety legislation.

Mechanization was forced upon the Scottish coalmasters as the only alternative to bankruptcy, and the unions accepted it as the alternative to unemployment and lower earnings. By 1927, 56 per cent of output was cut mechanically, and by the end of the interwar period the figure had risen to over 80 per cent. But average mine size in Scotland remained far below that for the British industry as a whole, and Fine et al (1985) relate this to the pattern of land ownership and configuration of relations between landowners and mineowners. By virtue of poor geological conditions and intensifying competition in export markets, Scottish mineowners were forced to invest in new production techniques. By the same token, however, they

were ill-placed to resist the landowners' demands for higher royalty payments, and royalties per ton in Scotland were amongst the highest for the British industry. The concentrated pattern of land ownership gave landowners the upper hand in negotiations, enabling them to restrict the expansion of mines - or ensure the extraction of coal (and hence royalties) from their particular estate alone (Ibid:296).

Geological conditions were very different in South Wales (although varied across the South Wales coalfield). The average width of seams worked in the mid-1920s was 53 inches, which compared with 39 inches in Scotland, and an average of 49.5 inches for the British industry as a whole (Ibid:295). Moreover, in the South Wales steam coalfield, which accounted for the bulk of exports from South Wales:

> The seams were naturally so intersected with 'slips and breaks' that under-cutting was practically unknown. Only a small part of the labour of a steam coal collier consisted in getting or loosening the coal from its natural bed.
> (H.Bramwell, ev.to Royal Commission on Coal Supplies, 1901-05)

Because of the limited amount of hand-holing required, coal-cutting machinery did not present the immediate advantage that it did for Scottish mineowners, while the occurrence of 'slips and breaks' also made the installation of coal-cutting equipment difficult.

But geological conditions do not provide a sufficient explanation for the low levels of mechanization in South Wales. Conditions were different in the western, anthracite area of the coalfield, where mechanization was also retarded, and the largest firm operating in the steam coalfield - the Powell Duffryn Steam Coal Co. Ltd. - was notable for its early application of mechanical coal-cutters and face conveyors (Hann, 1922; Boyns, 1987). Royalty payments per ton of coal extracted were higher in South Wales than

for any other coalfield (Fine et al:296). Unusually for South Wales and, indeed, for the British industry, the Powell Duffryn Company owned the freehold to a large acreage of its surface mineral land and underlying minerals (*Stock Exchange Year Book*, 1914; see also Boyns, 1987). The firm, in other words, was part-owner of the minerals it worked, and this would appear to be of extreme significance in the pattern of its development. Powell Duffryn's mining operations in South Wales were concentrated on a geographically compact area of the steam coalfield. In this area, the Company pursued a policy of opening new, large-scale pits, which were equipped with the latest technologies (Boyns, 1987), closing down older workings as these became relatively unproductive. This was in marked contrast to the steam coalfield's second largest company - the Cambrian Combine - which expanded through the acquisition of other companies. The firm's subsidiaries owned pits scattered across the coalfield, and in the 1920s little attempt was made to 'rationalize' these operations, while investment in new production techniques was limited (Ibid). In 1935, the re-formed Powell Duffryn Associated Collieries acquired the Cambrian's surviving operations, and subsequently closed many of these mines.

Aspects of the prevailing structure of work organization in South Wales might appear to complicate the introduction of machine mining; in particular, the single shift system. Mineowners had pressed for the introduction of a double-shift system in 1910, when the eight hours Act came into force (see chapter three). The employers renewed their efforts in 1919, when the working day was reduced to 7 hours by the award of the Sankey Commission. Clearly, double-shift working was secured at some mines; the issue of a 'bonus turn' payment for the afternoon or night shift was central at several pits. Moreover, some commentators attributed the

coalfield's rising accident rate to the extension of double-shift working from the early 1920s, although the Inspector of Mines also related this to the reduction of working hours. Because mineowners were refusing to revise shift payments, colliers were forced to intensify their work to maintain their earnings, and the Inspector attributed the rising accident rate to the 'speeding-up' of work (*Colliery Guardian*, 17.10.1924:1003). But it is also apparent that double-shift working had not been generally extended across the steam coalfield, since employers continued to complain of worker resistance to the change.

A principal objection to double-shift working was that it increased the risk of underground accidents, given the peculiar geological conditions of the steam coalfield. The colliers argued that because seams were friable and liable to 'squeeze', the mines had to be allowed to 'cool' - with seams left to settle - at the end of a working shift (*cited in Colliery Guardian*, 21.2.1919:670). But the fear that double-shift working would increase the risk of death or injury appears to have been most acute where mines still employed the pillar-and-stall system. Before the First World War, longwall mining had only been generally extended across the western, anthracite area of the coalfield. Mining engineers argued that pillar-and-stall working was retained in the steam coalfield because the seams were 'fairly thick, and did not possess roofs suitable for longwall, nor was there sufficient rubbish for packing' (Royal Commission on Coal Supplies, 1901-5:307). With the pillar-and-stall method, colliers worked in relative isolation. And it was because of this, according to one observer, that the men would only accept the double-shift system if they were allowed to choose the partner who was to work in their stall on the second shift. Only in these circumstances could they be assured that the face would be left in a

condition that would allow them to recommence work without the crippling fear of being buried by a collapse of the roof (cited in *Colliery Guardian*, 17.10.1924:1003). Objections to double-shift working could therefore be lessened by allowing the colliers to 'cross-marrow' in pillar-and-stall layouts, or by moving to the longwall system because here the men were grouped and could collectively take measures to lessen the risk of accidents. Thus, 'double shift work can only always be satisfactory among miners on a longwall face, such as the Barry system, or where conveyors are at work' (Ibid).

Longwall mining was employed more widely in the steam coalfield from 1914, and its extension was associated in part with the introduction of mechanical conveyors. While coal-cutters were only employed on a limited scale, South Wales accounted for 40 per cent of all face conveyors in use in the British industry in 1921. On the other hand, only 12-14 per cent of pits in South Wales employed face conveyors in the 1920s. There is no evidence of worker resistance to the installation of conveyors (or, for that matter, coal-cutting machinery). Indeed, A.J.Cook, then the Rhondda miners' agent, actively campaigned for the widespread adoption of mechanical cutters and conveyors, which he argued would raise productivity and allow collieries to lower their selling prices without further resort to a reduction in the miners' wages (cited in *Colliery Guardian*, 9.2.1923:344). And since the arduous job of filling formed a large part of the steam coal collier's labour, it is perhaps not surprising that the availability of mechanical conveyors aroused more interest than worker hostility.

There were disputes at pit level connected with the introduction of conveyors. As in Scotland, however, these revolved around the conditions of

accepting innovation rather than innovation *per se*. The men's concerns centred on the issues of job loss (in a context of deteriorating markets), safety at work (with, in particular, a concern to restrict the length of conveyor faces to no more than 100 yards, and ensure that adequate exits - or escape routes - were built and maintained), the revision of piecework price lists and rates for filling 'large' coal. Through the South Wales Miners' Federation, the miners urged the mineowners' association to agree to the formation of a joint sub-committee of the Joint Standing Disputes Committee, so that agreement could be reached on the 'conditions of employment where conveyors and coal-cutters are in use' (*Colliery Guardian*, 17.7.1923:406). The sub-committee was established in 1923 and continued to meet regularly up until the eve of the General Strike, at which point the mineowners announced they were withdrawing from all joint agreements relating to working methods and the use of coal-face machinery (*Colliery Guardian*, 3.7.1925:30).

In Northumberland and Durham, shift patterns had been altered in 1910. Existing arrangements had to be changed in order to comply with the eight hours legislation (see chapter three). The northern owners had opposed the eight hours Act, which reduced the excessively long hours of haulage workers and boys. But consequent upon the legislation coming into force, they had secured a third hewer's shift which greatly increased the utilization of their fixed capital investments. Shift patterns in the North East were apparently more suited to the mechanized mining system than, for example, those in South Wales, easing the transition to the new methods of working. But in the interwar years, developments in Northumberland and in Durham stood in sharp contrast. Fifteen per cent of Northumberland's output was cut mechanically in 1914. By 1927 the proportion had risen to 42 per

cent, and by 1938 to over 90 per cent. In Durham at the end of the interwar period, only 42 per cent of coal was cut mechanically.

Like Scotland, Northumberland was working progressively thinner (and harder) seams, and the high costs of hand-hewing may have combined with the coalfield's exposure to intensifying international competition to compel the early and sustained application of machinery (although slightly less than 50 per cent of pits employed coal-cutting equipment at the end of the 1920s). Durham had formerly enjoyed the benefit of better geological conditions. But here too, by the early twentieth century, the thickest and most easily worked reserves were nearing exhaustion, and many pits were progressing onto thinner seams. Royalty payments per ton of coal extracted were above the average for the British industry in Northumberland, but significantly below the level of payments in Durham where royalties per ton were only just below payments in Scotland. Patterns of land ownership may therefore have been significant in explaining the divergent paths followed in the two northern counties, but further research is needed to ascertain precisely how the land-mine ownership relation affected the reorganization of production.

As mining progressed onto thinner seams in Durham, the longwall method of extraction tended to displace bord and pillar working. Some firms complained that the men were prejudiced against the new method of extraction. Difficulties arose because of the 'necessity for the "cross-marrowing" of larger sets of men', because the longwall system was unfamiliar and the hewers had difficulty in achieving their normal shift earnings and, related to the last point, because the change in the method of extraction was the occasion for the re-negotiation of piecework price lists (*Colliery Guardian*, 5.6.1925:1381). There is scant evidence to

suggest, however, that the hewers' dislike of the new system actually prohibited determined managements from securing the transition, or comparable adjustments.

Thus, in an interesting example the management of one colliery evaded the possibility of disruption by developing 'the bord-and-pillar system to meet their requirements in opening out several thin seams as the thicker ones became worked out' (Ibid). A new method of working was introduced, with percussive machines used for coal-getting in the bord-and-pillar layout. Each stall, or working place, was cavilled to a set of 6 men who 'come in two at a time on three shifts'. Each pair was responsible for all the work in the place, including the timbering and repair work which had formerly been performed by separate grades, and while one hewer was drilling one side of the stall, the other filled the coal that had been ripped-down on the other side. One advantage of this system, as the management pointed out, was that coal-getting took place on three consecutive shifts. With mechanized longwall mining, the coal was only wound to the surface on one of the three shifts. But percussive machines - which accounted for two-thirds of all machines in use in Durham in the mid-1920s - were less powerful than chain coal-cutters, and by the end of the interwar period it would appear that mechanized longwall mining had largely displaced other systems of machine mining in mechanized pits in Durham.

In Nottinghamshire, as in the Midlands more generally, features of the established structure of work and underground employment would appear to be well-suited to the introduction of mechanized mining. Longwall mining had been employed throughout the nineteenth century, and stalls were generally much larger than in those districts adopting this system from the end of the nineteenth century. In many districts, there was already a well-defined

division of labour within the coalface work group, with some men confined to filling the coal out and under instruction from a stallman or butty. But in Nottinghamshire, the issue dominating industrial relations in the early 1920s was not the introduction of coalface machinery but rather the employers' attempts to reinstate the butty system - or to rescind the 'all-throw-in' agreement (see chapter four). Increasingly divided, the Nottinghamshire Miners' Association was unable to uphold the 'all-throw-in' agreement, and a similar arrangement was only re-established as individual pits moved towards the use of mechanical coal-cutters and conveyors.

Wages and Hours: The Struggles of 1921 and 1926

The foregoing survey of developments in the different coalfields offers litttle evidence to support the view that worker resistance to the introduction of machinery delayed mechanization. Existing structures of work organization could complicate the transition to machine mining, as for example where serial changes in working practices were involved. But conflicts between mineowners and mineworkers developed unevenly, could revolve around the failure to innovate, while the failure to innovate can be related in specific instances at least in part to the employers' ability to secure work intensification without mechanization, and/ or to hold down basis rates (particularly where unemployment was rising in the coalfields). The uneven pace of mechanization - as between and within different coalfields - cannot be analysed simply in terms of labour relations. Geological conditions complicated the suitability of different mining districts for mechanization, while the mineowner's incentive to invest in new production technologies was contingent upon the terms of the mineral

lease, and scope for renegotiation - in turn conditioned by specific and general economic conditions.

Since the incentive to invest in specific regions and localities was obviously weakened, however, this had knock-on effects for the industry as a whole, dampening the coercive force of competition. And because the extreme diversity in the organization of work that had marked the industry before the First World War was heightened by the very uneven process of mechanization, mineowners were ill-equipped to form any (constructive) common policy in relation to the reorganization and modernization of production. That the mineowners' outlook, 'as far as their business affairs were concerned...was highly individualistic' (Supple, 1987:410), owed to the fact that they operated in different markets and organized production processes under varying sets of conditions. Similarly, the solidarity forged by the mineowners in their determined opposition to the demands of the Miners' Federation reflected the interest that was shared in maintaining maximum individual discretion in the areas of wage and employment regulation, in order to accommodate widely divergent circumstances.

From the early twentieth century, and in spite of their very varied experiences of work, the miners had achieved a growing unity around the demands for a national wage structure, shorter hours, and improved health and safety provision. The miners were pressing for general increases in wages, a general reduction in hours, and uniform health and safety regulations, and their unity was a force for change in the industry. During the period of the First World War, the miners pressed for the extension of government controls and in 1919 they presented the explicit demand for the nationalization of the industry. If for most miners nationalization was

seen as the only means to achieve the reorganization of their industry and improved wages and conditions, for some it represented a first step on the road to socialism. Faced with the threat of a national miners' strike, and possibly much wider supportive action, the government appointed the Sankey Commission to enquire into the miners demands - which included a 30 per cent wage increase, a six hour day, and public ownership of the coal industry. The Commission recommended that these demands should be met (although sanctioning only a 20 per cent increase in earnings and a 7 hour working day in the first instance). But the government rejected nationalization, when the threat of industrial action had passed, and proffered as an alternative the formation of a Miners' Welfare Fund (see Kirby, 1977).

In March, 1921, five months earlier than planned, the government returned control of the industry to the mineowners. The immediate context was a slump in the export trade (export prices had been guaranteed under wartime controls), and the immediate result was a three month stoppage of work in the industry. The mineowners pressed for wage cuts and a return to district wage settlements. Additions to basis rates were thereafter related to profits in the different districts, under a national formula which was finally jettisoned at the end of the General Strike and miners' lockout of 1926. Rejecting the recommendations for the reorganization of the industry suggested by the Samuel Commission of 1925-6, the mineowners pressed for wage reductions and an extension of working hours. The miners resisted, but were defeated after a seven month lockout. With their defeat, parties in support of active government involvement in the reorganization of the industry were also overwhelmed (Fine et al, 1985). The mineowners won an increase in the length of the working day (raised to eight hours by

legislation in 1927), wage reductions and the abolition of the national formula dictating minimum wage rates. Wage reductions varied in their severity across the industry, but on average the miner's yearly earnings in 1928 were 15 per cent lower than immediately before the General Strike, and 25 per cent lower than the peak year of 1920 (Heinemann, 1944:42).

The miners were at their weakest after the General Strike. But there is little evidence to support the claim that this facilitated the diffusion and more intensive application of coalface machinery 'throughout the industry' (cf.Burns et al, op cit). Certainly the proportion of aggregate British coal output cut mechanically rose between 1927 and 1938, from 23 to 59 per cent. But the British industry still lagged behind international competitors in the application of new extractive technologies. In 1935, 45 per cent of British output was undercut manually, whereas hand-holing had virtually disappeared on the Continent. In that year, mechanized coal-getting accounted for 97 per cent of output in the German coal industry, 98 per cent in Belgium, and 88 per cent in France (ILO, 1938:196).

In Durham and South Wales, the British coal industry's principal exporting districts, levels of mechanization remained low - even by British standards. In Durham, only 42 per cent of output was cut mechanically in 1938 and 25 per cent conveyed mechanically from the coalface. In South Wales, the figures were 26 and 45 per cent. After the General Strike and lockout of 1926, miners had returned to work under the terms of new district agreements, each of which contained some 'individual characteristic'. In South Wales, the mineowners inserted a clause stipulating that 'where they, in their discretion think fit' they would be 'at liberty to introduce machinery and any method of working, notwithstanding that the same may involve a change in the system of

working' (*Colliery Guardian*, 17.12.1926:1361). Clearly this assertion of managerial prerogative was insufficient to achieve the widespread application of new production technologies. In 1938, only 28 per cent of pits in the coalfield employed coal-cutters at the face, and only 29 per cent had adopted mechanical conveyors (see table 5.2).

In South Wales, the proportion of firms using machinery increased between 1927 and 1938, but this reflected the fall in the number of pits in operation in the coalfield. There was no significant increase in the number of mines using machinery for coal-getting. As table 5.2 suggests, this pattern was repeated in most of the principal coalfields. In the period after 1926, therefore 'the increase in the use of cutters tended to be achieved by their extension *within* mines rather than by the widespread conversion of hand-getting mines to machine cutting' (Supple, 1987:383). In the British industry as a whole, and in most of the principal coalfields - Nottinghamshire, together with the smaller districts of Leicestershire and Warwickshire, forming an exception - large numbers of unmechanized pits remained in competition at the end of the interwar period. Since wage reductions and the extension of working hours were the preconditions for the survival of small mines and unmechanized pits, the defeat of the miners helped to sustain the industry's existing fragmented structure of production.

The British industry achieved only piecemeal changes to its existing organizational and technical structure. Combined with adverse conditions in domestic and export markets, this led to the creation of mass unemployment in the coalfields. Unemployment contributed to the downward pressure on wage rates, and in unmechanized mines there was a speed-up of work

TABLE 5.2, MECHANIZATION IN BRITISH MINES, SELECTED DISTRICTS, 1927 & 1938

	Cutting			Conveying	
	No.of mines	No. of mines using machines	% of output cut by machine	No. of mines using conveyors	% of output conveyed
Great Britain					
1927	2861	929	23	n/a	n/a
1938	2125	927	59	680	54
Scotland					
1927	506	270	56	n/a	n/a
1938	426	238	80	126	58
Northumberland					
1927	124	50	42	n/a	n/a
1938	102	65	91	43	45
Durham					
1927	277	99	18	n/a	n/a
1938	247	93	42	67	25
South Wales & Monmouth					
1927	639	110	7	n/a	n/a
1938	424	118	26	123	45
Lancashire & Cheshire					
1927	237	94	16	n/a	n/a
1938	155	80	68	57	72
South Yorkshire					
1927	143	52	11	n/a	n/a
1938	121	67	56	57	62
Nottinghamshire					
1927	46	30	22	n/a	n/a
1938	46	41	70	36	82
North Derbyshire					
1927	130	38	22	n/a	n/a
1938	103	52	88	42	74
Leicestershire					
1927	20	11	26	n/a	n/a
1938	19	12	84	12	71
Warwickshire					
1927	25	13	24	n/a	n/a
1938	21	13	69	12	69

Source: Annual Reports of the Secretary for Mines, Mines Department, Board of Trade 1927, 1938

as pieceworkers attempted to maintain subsistence earnings (see chapter 6). Sales and output slumped, and with persistent excess capacity in the industry in the late 1920s and 1930s, the rate of new pit development fell considerably below the levels of the early 1920s. In the 1930s, the annual level of capital investment (in plant and machinery) in the British coal industry was some 60 below that of the period between 1919 and 1925 (£3.09 million as compared with £7.57 million in the earlier period - Supple, 1987:388).

PRODUCTIVITY OUTCOMES

Mechanization was a slow and uneven process in the British coal industry and the results - in terms of productivity growth - were unimpressive. Between 1913 and 1938, output per manshift (OMS) increased by just 13 per cent. In the United States in the same period, and while there had been a significant reduction in working hours, OMS increased by 40 per cent. In the Polish coal industry, the German Ruhr, and the Netherlands, increases in OMS of 56, 64, and 101 per cent were attained respectively (Reid Report, 1945:141). Natural conditions were roughly equal in Britain, the Ruhr and the Netherlands. Yet by 1936, OMS averaged 1.83 tonnes in the Netherlands, 1.69 tonnes in the Ruhr, and only 1.2 tonnes in Britain (Ashworth, 1986:4).

Between 1929 and 1936/7, the proportion of British coal output undercut mechanically doubled. Output per manshift increased in this period by a mere 8.4 per cent. In the German Ruhr in the same period, there had been little increase in the level of face mechanization; even by 1929, over 90 per cent of output had been cut mechanically. And yet OMS in the Ruhr rose

by 34.5 per cent in the 1930s (Supple, 1987:284). The superior performance of the German industry owed in large measure to the concentration of output on fewer, large-scale and more productive mines. Economies of scale were secured, improvements in underground layout were made, and this facilitated investment in more effective methods of transporting the coal from the face to the shaft bottom, while more powerful winding equipment was installed in German mines.

The Technical Advisory Committee appointed by the British Government in 1944 to investigate the British coal industry's technical condition, drew attention to these sources of productivity growth in Germany. The Reid Committee, as it is more commonly known, noted that other European economies had improved their coal industries through a similar, sustained programme of rationalization and investment. Comparing the British coal industry's organization and technology most unfavourably with that of its Continental (and US) rivals, the members of the Reid Committee reserved some of their most scathing comments for British methods of underground haulage (see below).

All the members of the Committee were mining engineers with senior managerial experience in the coal industry. And by virtue of its exclusively technical and managerial composition, the Committee's Report was extremely influential - at least as far as British industrialists and the financial press were concerned. Social scientists from the Tavistock Institute of Human Relations were less impressed. Trist and Bamforth argued that the Reid Committee's engineering bias had led it to focus on 'shortcomings such as those of the haulage system' and to neglect other causes of low productivity in British coalmining. They proffered an alternative account, stressing the 'connexion between the health and

productivity of the miner and the social structure of the work system that controls his relationships' (1951:10).

The Human Relations Perspective

The Tavistock's work on coalmining had been initiated soon after the formation of the Institute in 1947 - the year in which the British coal industry was nationalized. The newly-established National Coal Board identified a series of labour management problems - absenteeism, labour turnover, high levels of small-scale strikes of short duration - and in addition the problem of relatively low productivity in British coalmining. Addressing these phenomena, the Tavistock researchers suggested that low productivity owed in large measure to the particular system of machine mining that had been adopted in Britain in the interwar years - mechanized longwall mining - and the social relationships fostered by work organization under this system.

In an interim report, published in 1951, Trist and Bamforth identified and contrasted two systems of work organization associated with the different technologies of hand coal-getting and the mechanical cutting and conveyance of coal from the face. Their empirical research centred on the Durham coalfield, and this may in part explain their failure to emphasize the variegated patterns of work organization in unmechanized mines across the industry. Trist and Bamforth argued that, prior to the introduction of coalface machinery, the system of work organization had been compatible with the available technology and well-suited to the unique features of the underground work situation. They suggested that this equilibrium had been disrupted with the introduction of the longwall layout, detailed division

of labour and multi-shift work system adopted with the introduction of mechanical coal-cutting in Britain.

Trist and Bamforth identified the mechanized longwall method as a 'technological system expressive of the prevailing outlook of mass-production engineering and as a social structure consisting of the occupational roles that have been institutionalized in its use' (1951:5). Their critique of it resonates with more recent accounts of a 'crisis of mass-production' confronting late twentieth century industrial capitalism, and the disadvantages - for firms - of 'Taylorist' forms of work organization (eg Piore and Sabel, 1984). Looking at the coal industry in the 1950s, Trist and Bamforth argued that the work system created with mechanization reflected a narrow engineering logic. The work had been broken down into a standard series of elementary tasks, arranged in rigid sequence over three separate shifts, and a large work collectivity instituted in place of the small work group, comprising multi-skilled craftsmen, of hand coal-getting. Tasks and shifts were technically interdependent, and the successful completion of the cycle of coal-getting demanded 'one hundred per cent performance' of each of the specialized component tasks. But no attempt had been made to integrate the 'cycle group' as a social unit. As a result, workers had been subjected to psychological stress and strains, as had underground supervisory workers, and labour productivity had consequently suffered.

The work system required a larger managerial input, as compared with hand coal-getting, and colliery deputies had been made responsible for maintaining the continuity of production. Yet, a host of changing environmental conditions threatened disruption at any point in the 24 hour cycle of production. Deputies had also to contend with mineworkers who, by

virtue of their values and traditions, resented close supervision and the loss of their former autonomy. Supervisor-worker relationships were therefore largely conflictual. Deputies had to deploy workers onto other tasks in order to deal with emergencies as these arose, and to maintain the continuity of production. But workers with narrowly-defined job roles would only 'flex' onto other work after haggling over overtime payments, or payment for 'bye-work'.

Faceworkers were confined to the performance of a narrowly-defined task, and the prevailing work system failed to utilize their knowledge and experience of underground work to the full. They were exposed to the dangers of underground work, but could not take preventative action on their own initiative which was an obvious source of stress. They performed a fraction of the complete operation of coal-getting, and rarely met underground with workers completing other stages of the production process on other shifts. Under such circumstances, they had little commitment to the successful completion of the cycle of operations as a whole, were encouraged to pass-off 'bad work' as someone else's responsibility, and to adapt to the disruptions that continuously occurred (possibly because of delays on preceding shifts) by adjusting their own work rate downwards.

The content of the faceworker's job, Trist and Bamforth argued, failed to engage him to the limits of his capabilities and restricted him to a level of performance below his potentiality. These problems had existed in the interwar years, but to an extent had been camouflaged by deleterious labour market conditions. In the circumstances of the 1940s and 1950s, however, workers were less inclined to tolerate bad working conditions and were more willing to express their frustrations through, for example, voluntary absenteeism. Trist and Bamforth concluded that a 'norm of low productivity'

had been established in the mines as the only 'adaptive method of handling, in the contingencies of the underground work situation, a complicated, rigid, and large-scale work system, borrowed with too little modification from an engineering culture appropriate to the radically different situation of the factory' (1951:23; and cf Zweig, 1948, on 'the stint').

For the Tavistock researchers, therefore, patterns of conflict and low productivity in the industry could be related directly to the particular system of work organization adopted with mechanical coal-cutting. And since, for these researchers, conflict emanated from a particular work system rather than from the nature of the employment relationship, they believed that work reorganization could bring management and worker interests to more perfectly coincide.

In developing their critique of the longwall method, the Tavistock group had been influenced by experiments underway in the British coal industry with alternative systems of machine mining. These included the mechanized room and pillar system, which had long been employed in the United States and which (according to Trist and Bamforth) involved a similar level and type of technology to the longwall method, but a different system of work organization. Trials had also been made with 'compositely' organized work teams on longwall faces equipped with power-loading technology. With both technologies, the work organization involved small work teams, the members of which were responsible for a number of different tasks, while the work group was not constrained by a rigid shift-system, but rather encouraged to move from one phase of the cycle of coal-getting operations to the next as the opportunity arose. The results of the NCB's experiments, in terms of labour productivity, had been impressive, and the Tavistock group attributed this to the new systems of work organization. They suggested

that the new arrangements partly reproduced those of hand coal-getting, gave the work group a measure of 'responsible autonomy', increased worker job satisfaction and lowered levels of stress. Higher OMS was argued to be the result of higher levels of work effort, and the latter proof of the benefits accruing to workers from the new work arrangements.

The Engineering Perspective

The Tavistock's work on coalmining formed the basis from which the group went on to develop the concept of the *socio-technical system* (see Trist et al, 1963). Their analysis has been interpreted as 'an attack on the trained incapacities of production engineers and as an advertisement for social scientific consultants' (Rose, 1975:213). Suffice is to say that many of the criticisms of the mechanized longwall system made by this group had been made by mining engineers in the interwar period. For example, David Gemmell, a Scottish mining engineer, in the 1920s was an outspoken critic of the unit system, or mechanized longwall method employed in the British coal industry. He argued that the extreme division of labour had lessened workforce skills, increased the monotony of work, and generally diminished the productivity of the machines by driving away 'men of the higher standard of intelligence' (NACM, 1921-2:190-5). Even the *Colliery Guardian*, the mineowners' trade journal, reported that work organization under mechanized longwall mining contrived towards the 'deadening of a man's soul' (9.12.1921:1607). And the fresh problems of labour management created with the sub-division of labour were discussed in management journals of the period, which devoted some space to the panaceas proposed by, for example, industrial psychologists (see chapter 6, pp.334-8).

The members of the Reid Committee, as suggested, were mining engineers and had grappled with the problems of motivating workers to work hard at routine (and physically strenuous) jobs in the interwar years. It is not surprising, therefore, that their Report, published in 1945, also addressed these managerial difficulties. The Reid Committee compared the different systems of machine mining employed in Britain, the United States and on the Continent. Looking at the mechanized room and pillar system adopted in the US bituminous coal industry, the Committee also suggested that this method alleviated labour management problems for employers, at least in comparison with the mechanized longwall method, and the arguments presented in support of this conclusion were very similar to those of the Tavistock researchers. With mechanized room and pillar mining, work groups were smaller, and performed the tasks of cutting and loading on the same shift. The Reid Committee suggested that workers were 'attracted by the greater variety of work, and the greater skill required in its performance', with the small size of work groups encouraging the development of a 'team spirit' (1945:40). A cursory glance at the American literature, however, and in particular at Carter Goodrich's study of work in US mines (1925), suggests that the difference in the mineworkers' experience of machine mining in the two countries was far less dramatic.

In any event, the purported connection between work organization, worker motivation, and work effort stressed by the Tavistock group was not isolated by the Reid Committee as the principal source of higher OMS under the mechanized room and pillar system. The Committee argued that the American system was more productive than the mechanized longwall method employed in Britain not because workers worked harder, but rather because the underground labour force was deployed more effectively. Mechanized room

and pillar mining involved a lower ratio of 'indirect' labour (or 'unproductive' labour as the Reid Committee termed it) to direct production workers. This was because roadways (or headings) were driven in solid coal and did not absorb as much labour on maintenance as the method of longwall advancing from the shaft, while other indirect tasks - such as 'packing the goaf' - were also unnecessary. Hence the Reid Committee reported that:

> The proportion of "productive workers" engaged in actual coalgetting operations is increased and, as unproductive labour is reduced to a minimum, a double advantage is secured, and a high OMS achieved. (1945:40)

Moreover, since the system was not 'dependent upon the completion of specific operations by the end of the shift, and the same operations are continued from one working shift to the next', the advantages of multiple-shift coal-getting could be attained. Under the system of machine mining adopted in Britain, only one cycle of coal-getting operations could be completed in a 24 hour period, which meant lower utilization of the capital invested.

A further benefit of the room and pillar system was that the area to be worked was 'proven' in advance, so that faults and slips in the seams could be detected before coal-getting commenced, and plans adjusted accordingly. The incidence of 'bad conditions', in other words, could be better predicted in comparison with longwall advancing where workers and deputies had to deal with these contingencies as they arose. The method of longwall retreating, whereby headings were initially driven outwards from the shaft to the boundary to block out the coal into a series of wide pillars, or longwall faces, which were then worked backwards towards the shaft, gave many of the same advantages as room and pillar working. The ratio of indirect to direct labour was reduced (in comparison with longwall

advancing), because roads were driven in solid coal, road maintenance was reduced, as was the 'deadwork' of packing the goaf with the roof allowed to subside as the working face retreated. With longwall retreating, moreover, it was possible to introduce double-shift coal-getting.

For all these reasons, the Reid Committee advised that henceforward in the British industry, the mechanized room and pillar system 'must be given first choice where natural conditions permit its application'. Longwall retreating was to be regarded as a second best alternative, with longwall advancing - the method which had been more or less universally adopted in mechanized mines in Britain - considered to be the least desirable of the three systems (Report: 45).

In the interwar period, many British mining engineers had been aware of the superiority of the American system. Thus, while Gemmell argued that the extreme division of labour under the unit system had degraded work and skills, he focused his critique on other defects of mechanized longwall advancing. He suggested that while the latter method had 'done so much to increase output', it now stood in the way of 'securing that further increase which we all agree is essential', because double-shifting was impossible and hence 'capital sunk in the pit is employed for less than 40 hours per week on remunerative work' (cited in *Colliery Guardian*, 9.12.1921:1607; and see also Brass and Hesketh, 1926). Mavor, the machine manufacturer, noted that the development of machines adapted to heading work and pillar extraction (that is, arcwall coal cutters) had removed earlier (technical) constraints to the adoption of the room and pillar system under British geological conditions. And he reported that the rapid development of headings made possible with arcwall cutters 'opened the way

to longwall retreating, which in many seams would enormously reduce the cost of deadwork' (1924:1510).

The reasons why longwall advancing remained the dominant system of machine mining in interwar Britain are difficult to establish with any certainty. The Reid Committee suggested that it reflected the short-term outlook of British mining companies; the great merit of longwall advancing lying in the fact that profitable coal-getting could begin with the minimum of delay once capital had been committed to opening-up a pit in the first instance. But this hardly explains the reasons for the short-term outlook of British mineowners.

The royalty system may again have been an important influence. Where fixed or dead rents were levied mineowners had to make royalty payments regardless of the tonnage of coal got out, and this encouraged the rapid extraction of coal (see chapter two). Dead-rents, were common, although by no means universal across the coalfields and, as a general rule, where mines were able to mechanize they quickly adopted the most productive technology (chain coal-cutters). But the royalty system could constrain the pursuit of other productivity-enhancing changes; as, for example, in Scotland where mines were quick to mechanize but where the industry was unable to secure scale economies through amalgamations. Since the royalty system could impede the most effective layout of mines, which in turn would have implications for the method of coal extraction, it is possible that the system's particular effects in certain localities had wider ramifications, distorting the forces of competition, and that this combined with broader economic conditions in the industry to discourage the transition to alternative systems of machine mining in the late 1920s and 1930s. Surplus capacity in the industry, for example, would have militated

against the double-shifting of mechanized pits (since many pits were operating below capacity), while unemployment and low wages may have lessened the incentive to introduce systems economizing on 'indirect' labour. Certainly labour market conditions can be identified as a factor in the British industry's retention of archaic underground haulage systems.

Haulage Techniques

Analysing the origins of low productivity in the British coal industry, the Tavistock researchers focused on levels of work effort at the face. But other commentators drew attention to the limited investment in productivity-enhancing technologies in British pits. Heinemann, for example, noted that in the US the rate of growth of productivity had been sustained through the application of power-loading equipment. Thus, while in the US bituminous coal industry in 1942, 'no less than 45 per cent of the output was loaded by machine, in Britain the power loader was practically unknown and the old method of shovelling on to a conveyor continued' (1947:71). She also followed the Reid Committee in condemning the antiquated and labour-intensive methods of underground haulage retained in the British industry.

In European coal industries, mechanization at the face in the interwar period was accompanied by investment in more effective methods of transporting the coal from the face to the shaft bottom. In many British mines, in contrast, haulage techniques remained much the same as those identified as 'best practice' in the late nineteenth century. Even in the 1920s and 30s, various systems of rope haulage, hand-tramming and pony-puttying were used on subsidiary roads, connecting the face with the main haulage routes. On the Continent at this time, mechanical conveyors were

used to gather the output from working faces and transport it to the main roads. Various rope haulage systems were used in the main (or primary) haulage roads in British mines. Tubs were linked together into sets of 15 or 20 and hauled up the incline by ropes attached to stationary engines. Such systems were 'manned by scores of haulage hands at different points' (Manley, 1947:22). On the Continent at the end of the interwar period (and also in the US), these methods were 'practically extinct', and rope haulage systems had been displaced by the use of locomotives in the primary haulage roads (Reid Report, 1945:68). British haulage methods were labour-intensive and the work entailed was amongst the most 'brutal and limb-racking' in the mines (Mitchell, 1933:89).

The Reid Committee concluded in 1945 that, 'no single operation associated with coal production in Britain offers more scope for improved efficiency than that of underground transport' (Report: 65). Twenty-five per cent of underground workers in the British industry were employed on haulage work, and the Committee estimated that the amount of coal handled per haulage worker averaged 5 tons per shift. This compared with 20 to 25 tons in Holland, and 50 tons or more in the United States. British haulage practice obviously contributed to the relatively low output per manshift, and it was estimated that had Dutch haulage methods been employed, OMS for underground workers in the British industry in 1939 would have been a third higher than the level actually attained. Outdated haulage techniques in British mines also acted as a 'brake on OMS at the coal-face', and set limits on what it was considered worthwhile to equip the face to produce (Reid Report: 66).

The Reid Committee suggested that mechanization in British mines had been approached the wrong way round, or starting at the face, when the process

should have commenced from the shaft bottom (Report:37). Some mining engineers had expressed a similar view in the 1920s and 1930s. Delineating the constituents of a 'system of mechanical coal mining', for example, Carson reported in 1926 that:

> The success of the whole system depends on the efficiency of the underground haulage, and for that reason the question of the particular haulage system to be adopted is worthy of careful consideration. It is no use introducing conveyors to deliver 20 tons per hour if the haulage arrangements can deal only with 10 or 15 tons. The defect, I fear, has been the cause - not always recognised - of most failures to introduce successfully conveyor systems. (1926:36)

Mavor (1924) made a similar point and pre-empted the Reid Committee in concluding that an efficient underground haulage system could only be attained through the planned layout and development of the underground workings.

But in Britain, the location and underground layout of individual mines had been influenced by other than technical considerations - that is to say, by the terms of the mineral lease and compromises struck between the mineowner and landowner(s). The uncertainties induced by the need to re-negotiate mineral leases militated against the planned development of pits, and planned underground layouts were essential for the reorganization and modernization of underground haulage systems. And since the productivity increases resulting from expenditure to enlarge pits, through amalgamations, and improve underground haulage systems, might be appropriated by the landowner through higher royalty payments, the incentive to make such investments would be reduced. Combining with the deleterious effects of the royalty system to sustain antiquated haulage systems were low wages in the British industry and high levels of

unemployment. Heinemann noted that the lowering of real wages after 1926 had enabled the industry to 'stagger on without the major technical reorganisation that was needed'. Methods of labour utilization, involving long hours and back-breaking physical work, may have perpetuated the high costs of reproducing labour power. But for individual employers this was of little immediate concern when mass unemployment in the coalfields meant that 'if the individual miner exhausted his strength after three shifts' work in a week at (a) killing pace....there was always a reserve of trained men anxious for a job' (1947:71).

CONCLUSION

This chapter has examined the partially-mechanized mining system introduced in the British industry in the interwar years. In this period, only the task of undercutting the coal was mechanized. Mechanical conveyors were used to transport the coal from the face to the subsidiary haulage roads. But coal was still loaded by hand, other underground tasks were performed manually, and the methods of transporting coal from the face to the shaft for winding to the surface remained much the same as those employed in the late nineteenth century.

In the British industry, chain coal-cutters were developed for longwall applications. Efforts to maximize the utilization of the machinery centred on undercutting a continuous length of working face during the course of a single working shift. But other operations had to be arranged over two subsequent shifts, so that only one cycle of coal-getting operations could be completed every 24 hours. Cutting, filling, and repair work were now performed on three separate shifts, and the work was broken down further so that within each shift there was a more intensive division of labour.

Colliers who had formerly been responsible for the complete operation of coal-getting were now confined to the performance of an elementary task. They were effectively deskilled and lost their immediate control over the pace of work, while new demands were placed on the management organization. Pit officials had to be deployed to coordinate the production process, and also to supervise and coerce workers. The successful completion of the 24 hour cycle of coal-getting operations demanded the punctual performance of each of the narrowly-defined component tasks.

Across the British industry, the transition from hand-holing to machine cutting was extremely uneven. Geological conditions complicated the suitability of different coalfields for mechanization, while the new work system impinged in different ways on existing arrangements and work practices. Conflicts between mineowners and landowners over the terms and conditions of change also developed unevenly within and between the different coalfields. An attempt has been made in this chapter to suggest the ways in which geological and market conditions, economic and social relations, could combine to promote or inhibit mechanization. But detailed empirical research is required to compare the circumstances of different districts and pits operating within them.

Mechanization was an uneven process, and the diversity in the structures of work and underground employment that had characterized the industry in the period before 1913 became even more pronounced in the interwar years. Organizing production under divergent conditions, and controlling different work systems, mineowners were unable to make broad concessions to the mineworkers. They resisted government intervention, or at least attempts to coordinate the reorganization of the industry and, with deteriorating market conditions after the First World War, pressed for wage cuts and a

return to district wage settlements. With the defeat of the miners in 1926, the mineowners secured wage reductions and an extension of working hours.

The overall level of mechanization in the British industry increased, but even at the end of the interwar period 40 per cent of output was undercut manually while hand-holing had virtually disappeared in European coal industries. And in the British industry, the increase in the level of mechanization in the period after 1926 was achieved principally through the more intensive application of machinery in mechanized pits. There was no widespread conversion of hand-getting pits to machine cutting. The defeat of the miners in 1926 thus consolidated the backward conditions in the industry. Wage cuts and the extension of working hours enabled small mines and unmechanized pits to remain in competition - although the cartel agreements established in the late 1920s and 1930s were also significant, and were a response to the industry's inability to reorganize (see chapter two).

With only piecemeal changes to the industry's organizational and technical structure, and adverse conditions in domestic and international markets, unemployment in the coalfields rose to unprecedented levels. Across the industry, working conditions deteriorated. Low wages forced a speed-up of work in unmechanized mines which, coupled with long hours, exhausted the miners, diminished their productivity and shortened their lives. The use of machinery heightened the risk of underground explosions and of dust-related diseases. Yet the law on industrial safety laid down in the period before the introduction of coalface machinery remained in force, unamended, throughout the interwar years. Chapter six, which examines the changing role of colliery deputies, shows how these officials were often

unable to perform their statutory safety duties because they were increasingly obliged to act as production foremen at the face.

Work intensification in mechanized and unmechanized mines was secured at the cost of the miners' health and safety. Individual firms could draw upon the reserve of unemployed workers to replenish their labour force as miners were maimed and injured, or forced to retire prematurely. But the cost to the industry, and to the wider economy, was high. Over the interwar period, the rate of fatal accidents in the mines increased, while the British industry attained a rate of growth of labour productivity far below that of its European and North American rivals.

CHAPTER SIX: COLLIERY DEPUTIES AND OVERMEN

This chapter examines the role and recruitment of underground supervisory workers in the British coal industry. It focuses on the colliery deputies, firemen and examiners, who were the first-line supervisors in the mines (1). But it also considers the changing functions of colliery overmen, or the officials who were immediately superior to the deputies in the managerial hierarchy. The discussion is organized in three broad sections. The first examines the role and responsibilities of colliery deputies in the period to 1913, when hand coal-getting remained the dominant method of coal extraction in the British industry. The second considers the attempts to organize deputies from the beginning of this century, and employer responses to the formation of independent trade unions representing supervisory grades. The final section addresses the changes in work and work relationships effected with the introduction of coal-face machinery, and employer attempts to meet the need for close supervision at the face developed with the transition to the partially-mechanized mining system.

SUPERVISORY WORKERS IN THE COAL INDUSTRY PRE-MECHANIZATION

In spite of recent academic interest in the capitalist labour process, and in the historical development of employer strategies of labour control, supervisory grades - in coalmining as in other trades - remain relatively under-researched (2). Supervisory workers occupied a critical position in the structure of control, or the 'key points of day-to-day contact between management and labor' (Spencer, 1975:178). They were directly responsible

for implementing emloyer policies and for eliciting 'appropriate' forms of employee work behaviour. At the same time, they were employees, recruited from the ranks of the workers they supervised and subject to many of the pressures experienced by the latter. As firms attempted to restructure work and work relationships, in response to industrial conflict and the forces of competition, supervisory workers often became the object of struggles between employers and workers with the former attempting to impose, and the latter to resist, a fresh work discipline (see Melling, 1980). A problem for employers in several sectors was therefore to maintain the loyalty of their subordinate officers and steer them away from union involvement, whilst at the same time ensuring that these grades implemented policies that would alter their skills and autonomy as well as those of the workers they supervised.

Obviously the paradoxes besetting foremen and supervisors varied, as did their functions, between sectors as well as over time. In coalmining, the position is complex by virtue of regional variations in work organization and the uneven development of the industry. In general, under the system of hand coal-getting, employers obviated the expense and difficulties of close supervision at the face by relying upon indirect mechanisms of labour control such as the piece-rate and subcontract systems. In some coalfields therefore, butties performed functions undertaken by foremen and directly-employed supervisory grades in other industries; hiring their day-wage assistants, determining the distribution of earnings, and supervising their subordinates at the face. But deputies, firemen and examiners (the different titles reflecting regional variations in nomenclature) had a coordinating role and had to ensure a regular supply of tubs and materials to the face. This involved them in the direct control of haulage workers,

although in some coalfields in the period to the late nineteenth century, this supervisory function would also be undertaken by butties or piece-rate foremen.

Under the various Mines Acts, deputies were also charged with certain statutory safety duties and principally the inspection of the working parts of the mine prior to the start of each coal-getting shift. For some commentators (Taylor, 1960; Griffin, 1971), these Acts were an important stimulus to the development of 'modern management' in the mines. Their passage was, although only in part, the result of pressure exerted by the mineworkers' unions on the state for the regulation of health and safety standards in the industry.

Mining Legislation and the Appointment of Safety Officers

Coalmining has always been one of the most dangerous occupations. In the nineteenth century, the industry's health and safety record was appalling with, for many years, 'more accidents reported in the mines than in all the factories and workshops in the United Kingdom' (Arnot, 1953:23). On average, four mineworkers were killed every day in the British coalfields in the years between 1880 and 1910.

With the working of seams at a greater depth from the surface, and with innovations such as the use of gunpowder for blasting the coal from the face, the frequency of colliery disasters had risen steadily from the beginning of the nineteenth century. Colliery capitalists were concerned to protect their property, especially as larger fixed capital outlays were required to work deeper seams. But they were engaged in production for profit and in the nineteenth century relied upon methods of labour utilization that caused the premature death of their employees. Coal

production was a labour intensive process, competition over markets was intense, and mineowners were vigorously opposed to legislation which threatened their ability to drive down wages or prioritize output above the mineworkers' health and safety. Pressure for safety legislation came from outside the industry, and from within it as more permanent trade unions were established. But Acts enforcing some minimal regulation on the mining industry were passed 'only in the teeth of bitter opposition from the coal-owners' (Arnot, 1953: 40).

Legislation in 1850 empowered the Secretary of State at the Home Department to appoint Inspectors of Mines, whose duties would include underground inspection of the workings. But the Act did little more than establish the principle of inspection. Only 4 Inspectors were appointed for the whole of the industry in 1850, with the Inspectorate increased to 6 in 1852, and to 12 in 1855 - when the industry embraced over 3,000 mines. Nevertheless the 1850 Act was described by Lord Londonderry - a Northern landowner and colliery capitalist - as 'the most mischevious and unjust measure that could possibly be imagined' (cited in Arnot: 40).

Legislation in 1855 introduced 7 General Rules governing coal (and metalliferous) mines, and the provision for Special Rules to be introduced at individual mines. Penalties for the breach of the Act were introduced, although these were of a 'double kind'. Mineowners were liable only to be fined (up to £5) for failing to observe the safety regulations, while mineworkers could be fined or imprisoned. Moreover, while the composition and bias of Magistrates' Courts generally protected mineowners from any further liabilities, the Special Rules could be constructed more or less as employers chose and hence could be used as a further disciplinary sanction against employees (see chapter three).

The legislation enacted in the period to 1855 in effect did little to improve safety and working conditions for mineworkers. The General Regulations were few in number, the Inspectorate established to enforce them was meagerly resourced, while colliery officials were often ignorant of the regulations, incapable of applying them in the interests of safety, or had as yet to be appointed (Arnot: 41). Where mineowners subcontracted production and supervision to butty-men and charter-masters, for example, the latter were under an incentive to minimize costs - such as timber for the roads and face - and to maximize output regardless of the dangers to which both they and their assistants were exposed.

The Coal Mines Regulation Act of 1872 ostensibly altered this situation. The number of General Rules was increased to 31, including the provision that in the future all mines, except those employing less than 30 workers below ground, should be under the control and daily supervision of a duly trained and certificated manager. Certificates of competency, awarded by examination boards appointed by the Secretary of State and testifying to candidates' technical training and not simply their practical experience, were divided into two classes under the Act of 1887. Mine managers were required to hold first class certificates, and to have had at least 5 years' practical experience in a mine. Under-managers were required to hold second class certificates, awarded after an examination of a less-exacting standard.

The 1887 Coal Mines Regulation Act introduced 8 new General Rules, including the requirement that the owner, manager or agent of a mine appoint at least one 'competent person' for safety duties; principally, the inspection of the working parts of the mine before the start of each shift, to 'ascertain the condition thereof so far as the presence of gas,

ventilation, roof and sides, and general safety are concerned' (General Rule 4, 50 & 51 Vict. c.58). The officials appointed for these duties were the colliery firemen, examiners and deputies, the different terms reflecting regional variations in nomenclature with the 'three names meaning one and the same person in different parts of the country' (W.Frowen, in evidence to the Sankey Commission, 1919, Vol.1, Q.4793).

Various writers have identified in the Acts of 1872 and 1887 a stimulus to change 'in organizational and managerial institutions which the technical and economic needs of the industry were already beginning to demand' (Taylor, 1960: 231). Mineowners were forced to appoint salaried officials, and the Acts made these officials statutorily responsible for safety in the mines. The 'free reign' of the butty-men and charter-masters had therefore to be curtailed, and many of the functions performed by these men were usurped by management and/or reallocated between grades of subordinate officers directly-employed by the company. Stipulating the minimum qualifications for promotion to the position of colliery manager, the Acts placed increasing weight on technical training as opposed to practical, mining experience and, according to Taylor, gave mine management a 'professional status'.

Certainly an immediate effect of the legislation was the formation of a National Association of Colliery Managers - an organization which became a focus for opposition to further regulation (Church et al, 1986:432). But small mines - of which there were many in the industry - were excluded from certain of the provisions of the legislation, while the wording of the Acts provided ample scope for the evasion of their principles. Thus, the Royal Commission on Mines reported in 1909 that although it was generally assumed that the 1887 Act had established the principle of 'one mine, one manager',

this was not in fact the case, section 21 providing only that daily personal supervision shall be exercised either by the manager or under-manager.

> In practice, a manager or an under-manager often acts in that capacity for more than one mine, which is apparent from the fact that the number of mines at work under the Coal Mines Regulation Acts is about 3,200 and the number of managers and under-managers at present holding appointments is about 1,500 and 1,700 respectively.
> (Royal Commission on Mines, Second Report, 1909: 36)

Hence, mines might be left in the overall charge of an under-manager or even, on the back shift, the overman, and the overman had no statutory responsibilities for safety, while the Mines Acts did not stipulate any qualification for this class of official (see below). The overman's responsibility was for production and even in the interwar period of this century he might enjoy wide discretionary powers in the execution of his duties.

Safety and Output: The Dual Responsibilities of Colliery Deputies

There is little information as to the numerical significance of colliery firemen, examiners and deputies in the British coal industry in the late nineteenth century. Evidently such officers were employed in some pits and districts before the Act of 1887 which made their appointment a statutory obligation. But practices would have varied enormously, by virtue of regional variations in work organization.

The different job titles, used according to custom in the different coalfields, reflected the original functions of these officials. Thus:

> The title of 'fireman' is a survival from the time when it was the practice to send someone in advance

> of the workmen into the workings to render them fit for work by burning off any firedamp that might have accumulated there since the previous day.
> (Royal Commission on Safety, Report, 1938: 181)

That of 'examiner' was derived from one of their chief duties, that is, to examine the conditions of the workings. The term 'deputy', on the other hand, gave more expression to their 'peculiar position in the mining industry....between the mine owner or manager and the mine worker' (Frowen, Sankey Evidence, 1919, Vol.1: Q.4793). Firemen, examiners and deputies were safety officers while they also occupied the lowest rank in the managerial hierarchy. Significantly, the Royal Commission on Safety, which reported at the end of the 1930s, argued that the term 'deputy' was to be preferred because 'that name most appropriately indicates the duties that should devolve on the person who, in his own area, represents, or deputizes for, the manager, under-manager, or overman as the case may be' (Report, 1938: 181).

Deputies were allotted 'districts' within the mine over which they exercised a 'general supervision' (Royal Commission on Mines, Second Report, 1909:39). Before 1911, there was no restriction in any part of the country as to the duties which they could perform in addition to their statutory safety duties. Thus, while the 1887 Act was primarily a safety regulation, it 'gave the owners the power to use these officials for the purpose of production which sometimes can only be done at the expense of the miners' safety' (Stewart, 1935: 55). While in practice the deputies' work might include a good deal more than simple inspection, the actual content of their jobs would vary with 'the different systems or methods of

work prevailing in different parts of the country' (Frowen, Sankey Evidence, Vol.1: Q.4793).

The execution of their safety duties was likely to involve them in a certain amount of physical work. Hence in South Wales, the examiner had to 'see that everything is kept in repair...; he has to put up brattice-sheets for the ventilation in the district he is in, and supposing he comes across a damaged door, it would be his duty to assist in repairing that door, so that ventilation could go on its proper course' (J.R.Powell, Monmouthshire and South Wales Examiners' Association, in evidence to Royal Commission on Mines, 1909: 52). And in some districts, the deputy had a definite role in the division of labour. Thus, in Northumberland and Durham, where the underground employment hierarchy was most finely articulated, deputies were required to 'set most of the timber both at the working-face and on the roadways' (Royal Commission on Mines, Second Report, 1909: 39). Elsewhere, the collier or coal-face work group would be responsible for performing this work.

But deputies were also production and labour superintendents, charged by higher levels of management with the responsibility for maintaining discipline in their particular district and for output maximization. They had a coordinating role, and had to ensure the continuity of production by maintaining a regular supply of tubs, timber, and materials to the face. This would involve them in the direct control of haulage workers, unless this funtion was performed by a butty or piece-rate foreman although the subcontracting of haulage work was generally confined to the Midlands and was a practice that had more or less been eliminated by the late nineteenth century (Rowe, 1923; Griffin, 1971). Thus in Scotland, firemen were reported to have 'other duties to perform than safety, such as clearing

roads, putting up timber where repairs were needed, regulating the trams and keeping the drawers going properly, and seeing that the work goes on regularly' (J.Weir, on behalf of the Scottish Miners, Royal Commission on Mines, Second Report, 1909:51). And with direct experience of the situation in South Wales, Tom Richards, the miners' M.P., informed the Royal Commission on Mines that it was 'sometimes the man who has the most influence and command in getting hauliers to drive coal rapidly who has the qualification which is looked upon with favour' by mineowners and managements (Second Report: 40). But of course the adequate supply of empty tubs to the face, and their prompt removal after they had been filled, was not simply the concern of management. Colliers were paid by the amount of coal cut and filled and would be likely to complain if a shortage of supplies interrupted their work. It is not surprising, therefore, 'to learn that often haulage workers were bullied and harassed, and that they in turn were often concerned with deceiving the deputy' (Goldthorpe, 1959:217).

Hand coal-getting remained the dominant method of coal extraction in the period to 1913. While the powers of the charter-masters or big-butties had gradually been circumscribed, mineowners continued to rely upon indirect mechanisms of labour control at the face. Piecework colliers had 'functional autonomy' over their own skilled work, and hierarchical control over their day-wage assistants. The deputies' role at the face was restricted. They had to act in a 'service' capacity to the faceworkers, ensuring that the latter were kept supplied with tubs, materials and timber (Ibid: 216). Any attempt to overstep this mark, to execute other than their 'servicing' and safety duties and to interfere in the colliers' work, was likely to be strenuously resisted by the piecework coal-getters. Yet, and as suggested in chapter three, the degree of autonomy enjoyed by colliers

was not uniform or constant. The amount of contact between faceworkers and supervisors varied between coalfields and over time.

Campbell and Reid (1978) note the attempts by Scottish coal companies to limit the collier's 'independence' by insisting upon more regular hours of work over the late nineteenth century, and various witnesses before the Royal Commission on Mines reported that the deputy had to keep 'the time of every man and boy in his district' (J.R.Powell, South Wales, Second Report:52; see also Parry Jones, 1925:50). Deputies might be responsible for 'measuring-up deadwork' performed at the face - timbering, packing, ripping the roof and floor - and haggling over the payment for coal-getting in 'abnormal places', although these duties were more frequently allocated to the deputy's immediate superior, the colliery overman, or to the overman's superior, the under-manager of the mine. The potential for conflict between supervisors and faceworkers would of course be influenced by managerial practices and cost-cutting exercises, and by work organization at the face. Hence it was reduced in the North East where hewers were paid simply for getting and filling the coal, and increased in other districts, and notably in South Wales where payment for 'deadwork' represented some 23 per cent of the collier's earnings (see chapter 3). In the North East, the cavilling system equalized the chances of 'drawing' an unfavourable working place for the hewers. Elsewhere, however, deputies were responsible for the allocation of working places at the face and according to 'Dataller' this authority formed 'fruitful ground for bribery' (1925:62-4).

For some writers (eg Wellisz, 1953), the transition from bord and pillar to longwall mining in the late nineteenth century (or prior to the introduction of mechanical coal-cutters and conveyors) involved an attack

on the craft status and autonomy of the collier, a fundamental change in the deputy's role and in the nature of supervisor-worker relations at the face. Longwall mining involved the continuous extraction of coal along a broad coal face. Its introduction has been argued to have involved the reorganization of work, with the imposition of a more detailed division of labour at the face and formation of larger work teams, and to have facilitated (or demanded) more intensive managerial supervision of the labour process, with deputies required to coordinate specialized job roles and direct the pace of work. This interpretation has been examined critically in chapters 3 and 4, and need not be pursued here other than to stress that struggles over the control of work developed unevenly as between (and within) the different coalfields.

In comparison with bord and pillar working (which embraced a great variety of arrangements) the deputy might be required to play a greater role in coordinating the work of different work teams (each performing the complete operation of coal-getting), in order to ensure a regular advance of the longwall face. But this function might be undertaken by the stallman or contracting collier as, for example, in the Midlands where the working face was divided into fairly lengthy units, stalls, or 'places'. And longwall mining of the nineteenth century variety often meant that the face was advanced in a stepped line, with colliers working in discrete 'stalls', so that the deputy's role would still be limited. In a purely technical sense, longwall mining might place the deputy in a better position to observe the faceworkers. But his ability to direct them, or to interfere in their work, might still be restricted and not least by job controls.

Available statistical evidence does suggest an increase in the numerical significance of supervisory workers - deputies and overmen - in the first

quarter of the twentieth century, or prior to the extension of machine mining. Supervisory grades formed 3.4 per cent of the underground workforce in 1905, and 3.5 per cent in 1913 (Royal Commission on Safety, Report, 1938:51). Over the same period, faceworkers declined slightly as a proportion of the total employed below ground, from 57.8 to 53.9 per cent. The upward trend in the employment of supervisory staff continued in the period 1913 to 1924, although the figures supplied by the Samuel Commission in 1925 make it difficult to ascertain the dimensions of this increase since the sample population of mines surveyed had changed.

TABLE 6.1: Number of deputies and overmen, and supervisory staff as a proportion of the total employed below ground, 1913-1924.

	1913 (so far as particulars were supplied)		1924 (the same mines as 1913)		1924 (all mines for which particulars were supplied)	
	No.	% of all B/G	No.	% of all B/G	No.	% of all B/G
Deputies	19,946	2.8	24,589	3.1	28,756	3.1
Overmen	2,901	0.4	3,583	0.4	4,295	0.5

Source: Samuel Commission, 1925, Vol.3 Appendix 1. Table 13. Page 197.

The increase in the number of deputies employed was due in part to the Mines Acts of 1887 and 1911, with the latter stipulating more precisely the maximum size of the deputies' underground districts and hence compelling some firms to augment the ranks of their subordinate superintending staff.

But mineowners were not statutorily obliged to appoint overmen, and the increase in this class of official therefore does suggest some 'autonomous' development in managerial practice. There is some evidence to suggest that larger firms, particularly in exporting coalfields, were attempting to intensify labour and reduce costs through centralized, cost-accounting techniques. Overmen were deployed to achieve performance targets in the various underground districts, with these officials brought under tighter managerial control and excited to reach - and surpass - targets in their districts by incentive schemes (Jevons, 1920, and see below).

Such developments would have enhanced the scope for conflict between the overmen and deputies, and between deputies and colliers if the former were obliged - for example - to tighten-up on time-keeping at the face. But they were uneven, and added to existing variations in the numerical significance of supervisory workers which were in part a function of regional variations in work organization. Thus, Ridley Wareham, the managing director of the Ashington Collieries in the North East, chastised correspondents to the firm's 'magazine' who had complained in the early 1920s that the company was 'wasting money' on the employment of underground officials.

> Our correspondents appeared to regard the officials as a sort of military police. We may say at once that we do not agree with that view. The main duty of the officials in the pit is to help the men. They see that the supply of tubs is regulated as well as possible. They save waste on materials, and, above all, they endeavour to make safety the first consideration. From our personal knowledge we are satisfied that without their help the present daily outputs would be quite impossible. (Cited in *Colliery Guardian*, 6.1.1922: 44).

But across the North East in general, colliery deputies represented a higher proportion of the underground labour force than in many other coalfields. This was because the hewers were more specialized and the deputies had a more prominent role to play in the coordination of production. Distinct grades of labour were employed on 'deadwork' at the face, including the deputies who had to set the timber props. In 1907, supervisory personnel formed 4.6 per cent of the underground labour force in Northumberland, 5.0 per cent in Durham, 4.0 per cent in Scotland, 2.7 and 2.6 per cent respectively in South Wales and Yorkshire (Eight Hours Day Committee, First Report, 1907, II, Table 1: 40-126).

Standards of Competence

The Coal Mines Regulation Act of 1887, placed upon employers the statutory obligation to appoint 'competent persons' for safety duties below ground in the mines. But the Act did not stipulate any qualifications for the position of fireman, examiner and deputy, and did not restrict these officials to the performance of safety duties. In practice, firemen and deputies were the 'non-commissioned officers' of the mines. They were recruited, by management, from the ranks of the mineworkers - often, although by no means invariably, from the men at the face - to a position at the bottom of the managerial hierarchy. They were the officials in closest daily contact with the mineworkers and formed the 'chief connecting link between the workmen and the senior officials of the mine' (Royal Commission on Safety, Report, 1938: 181), and upon them were devolved certain production duties over and beyond their statutory responsibilities for safety. They had to maintain discipline in their district, apportion supplies, and ensure the continuity of production.

From its inception in 1889, the Miners' Federation campaigned for improved health and safety provision. In its submissions to various inquiries and commissions, the MFGB emphasized the conflict between the deputies' dual responsibilities - to management for output maximization and to the men and in law for the safety of employees. Union officials questioned the extent to which deputies were free to perform their statutory responsibilities; for example, to insist that the face and roads should be adequately timbered when their employer was attempting to maximize output and minimize wage costs. The MFGB also questioned the extent to which the men appointed as deputies were competent for the job of safety officer. Deputies were appointed by mineowners or their managers, and the selection of these officials might reflect priorities other than safety; for example, their loyalty to management and ability to 'drive' hauliers rather than to test for gas. On the other hand, firms might recruit men with little or no experience of underground work and simply to comply with the wording of the law.

Inquests held after colliery accidents had occurred often portrayed colliery officials in a less than favourable light, and revealed the way in which safety considerations had been subordinated to the mineowner's concern to maintain output and minimize expenditure in spite of the dangers to the miners' lives. Through its officers, the MFGB had done much to ensure that the causes of such disasters were ascertained, and the extent of managerial negligence publicized. The Richards-Smith report into the Whitehaven disaster in 1910, in which 136 were killed through an explosion of firedamp, denounced the 'reckless indifference displayed generally by the officials at this colliery to the danger of fire-damp and coal dust', and noted that from the deputies' reports it was 'impossible for the

Manager day by day to have correct knowledge as to the state of the workings of the colliery' (cited in Arnot, 1953: 32). Other critics pointed to the 'general loosenes of administration' in the mines, with deputies afforded the scope to become petty tyrants in their district and to discharge their production duties through 'bribery and the like' (Dataller, 1925: 62-3). But, as Parry Jones emphasized, senior officials had often been successful in evading liability for deaths and injury at mines in their charge by claiming before inquests that the responsibility lay with incompetent or duplicitous under-officers (1925: 50). 'Loose administration', moreover, reflected on the general managerial practice and priorities of the firm and, as regards the Whitehaven colliery, the Richards-Smith report concluded that general managerial practice 'appeared to have been not how far can we keep the workings from any source of danger, but how near can we approach that danger without a catastrophe'.

Owner and manager indifference to safety might be reflected in their choice of men for the position of deputy. But even the most 'competent persons' would have difficulty in enforcing safety regulations in the face of employer hostility or, for that matter, opposition from the workmen. While the Miners' Federation campaigned for tighter safety legislation, in production it was not uncommon for colliers and deputies to collude in the evasion of existing provisions. Colliers were paid by the amount of coal cut and filled, and the piecework system placed them under an 'incentive' to take risks, and this was especially the case when wage-rates were depressed (Jones, 1936:20). Moreover, under the Mines Acts deputies were required to report to management the names of men performing unsafe practices, with senior officials reserving the right to take disciplinary

action. Colliers not unnaturally resented being 'spied on' and might make the deputy's life hell if his reports caused them to be fined or penalised in some other way (Frowen, Sankey Evidence, 1919, Vol.1: QQ. 5056-7).

Deputies had dual responsibilities, for output and for safety. To discharge either effectively they had to maintain viable relations with the workforce. According to Manley (1947), the deputy had to have a 'real flair for controlling men'.

> ....unless he has it, his position is hopeless. And he has to deal with men who can be pretty tough. They are not the sort to be bullied, and he has to humour them while at the same time making certain that his orders are carried out. (p.30)

His chief resources might be a 'lifelong knowledge both of the processes with which he worked and of the people who worked them' (Melling, 1980: 191). Thus, while colliers resented 'undue interference' in their work, and deputies who simply reported 'bad practices' back to management, they had an obvious interest in safety and would be more likely to respond to instruction and advice from deputies who they considered to be experienced workmen and who displayed a principal allegiance to the well-being of the mineworkers. Such qualities, however, would not always be valued by mine owners and management. Scottish mineowners claimed that they would not appoint faceworkers to be firemen because they were too familiar with the men and as a result were unable to impose discipline on them. In the Scottish coalfields, firemen were generally recruited from the roadsmen or 'other persons who had not had the experience at the face'. But as representatives of the Scottish miners' union pointed out, this was not because of the calibre of such men, but rather 'because of their

cheapness'; the customary wage of roadsmen being considerably below that of hewers at the face (Royal Commission on Mines, Second Report, 1909: 40).

The Miners' Federation campaigned for safety to be made a priority and for legislation that would impose uniform standards on the industry. Existing methods of labour utilization meant that the costs of reproducing labour power were high; miners were exhausted by their work, exposed to accident and injury, forced into premature retirement or to an early death. But because structures of work organization varied across the coalfields and uniform provisions were likely to impinge unevenly on different sections of the industry, mineowners could unite only to oppose such legislation, or to retain the maximum individual autonomy and employer discretion to continue to exploit labour through existing, crude methods. Deputies were caught between these conflicting forces and interests and, for Parry Jones, this 'body of men' were 'deserving of far greater sympathetic consideration than they actually receive'. They were, he argued, subject to the 'continual buffeting of those three great forces: the State through its Mines Inspector, the management through its chiefs, and the general body of workmen through its organisation' (1925:50).

The Royal Commission on Mines and Coal Mines Act, 1911

The representative organizations of mineowners and mineworkers articulated divergent conceptions of the deputy's role, and of the qualifications necessary for the position, before the Royal Commission on Mines, appointed in 1906. The rate of fatal accidents in British mines had fallen slightly from the end of the nineteenth century - from 206 workers killed per 100,000 employed below ground in 1890, to 173.6 in 1913 - although the absolute number of deaths and injury through accidents remained very high.

Periodic disasters - such as that at the Whitehaven pit - forced the dangers of this trade into the consciousness of the general public, while the experience of foreign competition in export markets had stimulated a broader discussion on the standards of British mine management. The Miners' Federation had continued to campaign for higher safety standards, and three of its executive officers were appointed as members of the Royal Commission on Mines which was established to 'inquire into and report on certain questions relating to the health and safety of miners, and the administration of the Mines Acts'. Mineowners and government officials were also appointed as Commissioners.

The Royal Commission sat for three years, and considered a wide range of issues pertaining to health and safety, including the qualifications and role of colliery firemen, examiners and deputies. Witnesses called by the MFGB argued that, in general, the standards of competence amongst this class of official were too low. They argued that the job was concerned with safety and hence that the men appointed to it should have considerable knowledge of underground conditions and, in particular, practical experience of work at the face. They furnished details of deputies who lacked such experience, with many of these examples drawn from the Scottish coalfields where, according to the Inspector of Mines, the 'duties of firemen...are looked upon as a job for which anyone is good enough' (Royal Commission on Mines, Second Report, 1909: 41). On behalf of the Lanarkshire miners, Mr.Kelly reported that he had 'known of men filling the position of fireman who had no experience whatever of work in a coal mine', and of one man who had 'come from the surface and before he was three months in the coal pit he got the position of fireman, and he had never previously been down the coal pit' (Ibid).

Practices varied across the industry, however, as did the particular experiences of mineworkers, and at least two representatives of the workmen - one from Lanarkshire, the other from Durham - reported their high regard for the deputies and belief that in general the 'best men' were appointed to the post, although there were exceptions (Ibid:40). In Durham and Northumberland, of course, deputies worked at the face and were recruited to it - and thereafter to their position as under-official - after a lengthy underground apprenticeship. Details of the work experience of firemen in Lancashire and North Staffordshire, moreover, suggested that in general these officials had been appointed after several years' experience of underground work. Most had been colliers and, prior to their promotion to the face, drawers or haulage hands.

But the length of underground work experience was no guarantee that the deputies' reports would be taken seriously by higher levels of management. And it was not necessarily a sufficient qualification for the performance of safety duties. Thus, evidence presented to the Commission suggested that a significant number of deputies had worked below ground for too many years, their eyesight having deteriorated to such an extent that they were incapable of making routine tests to detect the presence of gas (Ibid: 48-9). Mineowners might appoint older men in order to retain the services of younger, and less physically-exhausted workers for coal-getting at the face, and the Inspector of Mines for the East Scotland District reported that 'he had known of cases in which old men - over 70 years of age - had been appointed firemen though they were physically incapable for the work' (Ibid:41). Deputies were required to make reports of their inspections, and so that senior officials were kept informed of underground conditions. But the Commissioners heard evidence of deputies who were illiterate, or who

could only sign their name, and where the fireman 'put his cross down and the overman signed the name for him' (Ibid: 46).

Details were also furnished of men who had been appointed as deputies but who did not 'even know the rules...applicable to their duties' (Ibid: 40), and there was evidence that a significant proportion of officials had not been trained in modern techniques for testing for gas (p.45). Such evidence was used in support of the miners' demand that, in addition to a minimum number of years of practical underground experience, candidates for the position of fireman, examiner and deputy should possess a certificate of competency testifying to their general qualifications and technical training.

Representatives of mineowners and managers, on the other hand, were adamant that the deputies currently in post were 'thoroughly competent for their duties' (p.42). Opposed to any limitation of their managerial prerogative and freedom to select men who they considered 'fit' for office, they argued that a 'certificate of qualification was neither necessary nor desirable'. The qualifications necessary for a fireman or deputy, they maintained, 'both as regards practical experience and knowledge and moral character cannot be tested by any system of examination, but they can only be ascertained satisfactorily from the personal observation and enquiries of higher officials'.

Mineowners maintained that the chief qualifications for the position of fireman, examiner and deputy were practical experience and the ability to control men. They objected that a theoretical examination would deter 'practical men' from coming forward for promotion, while men who were technically competent did not necessarily make suitable firemen. Thus, Mr.Madew stated that there were 17 men holding second class certificates of

competency at his pits. Some of these men were employed as datallers, others as stallmen, but 'they were not fitted to be firemen as they had not the practical experience necessary or the capacity for maintaining discipline' (p.44). Other witnesses argued that colliers did not necessarily make suitable firemen - either because they were 'indisciplined' in their own work habits, or because they were incapable of imposing discipline on others - and therefore objected to any rule that would make work experience at the face a compulsory requirement for candidates. One owner from Yorkshire, on the other hand, argued that 'some of the best men' - or those most capable of maintaining discipline - 'would be contractors', but that such men would not care for the position since deputies were paid on a day-wage basis and hence did not have the scope to increase their earnings by intensifying their own labour or that of their day-wage assistants.

Such evidence revealed the objection to any legislative constraint on managerial discretion, and a general reluctance to elevate the status of deputies as safety officers, or the standards of technical competence among subordinate colliery officials. The owners' position received some support from the Mines Inspectorate (drawn from the ranks of mining engineers and mine management), insofar as the latter considered certificates of competency to be a superfluous requirement and that the 'responsibility for appointing competent men should rest as at present with the management'. But the Mines Inspectors did recommend some ruling as to the minimum length of practical experience required before candidates could be appointed as deputies, and also recommended that the status of such officials should be elevated by raising their pay and conditions - so that the 'best men' would be attracted to the job and tighter discipline maintained.

The three Commissioners representing mineworkers were therefore outvoted in their demand that deputies should hold certificates of competency. The view of the majority, expressed in the Commission's report, was that while 'firemen and deputies would be the better for any theoretical qualifications they may possess....the essential qualifications are a thorough practical experience in the work they are called upon to undertake or supervise, soundness of judgement in dealing with emergencies, and ability to control men' (p.46). In the view of the majority of the Commissioners, such qualifications could only be ascertained by management and hence the Report recommended that managerial discretion over appointments should be maintained. Certain (minimal) qualifications for the position were suggested. Candidates should be at least 25 years old before promotion, have had at least 5 years' practical underground work experience, with at least 2 years' work experience at the face. They should possess a certificate testifying to their ability to detect gas, and that their eyesight was adequate to perform such tests. As regards the duties of firemen and deputies, the Commissioners noted that 'their functions are liable to be interpreted in a wider sense in some districts than in others'.

> The arrangements made at some mines admit of the firemen devoting their time exclusively to questions connected with the safety of the mine, but in others it appears that their duties extend to other matters connected with the general working of the mine. (Second Report: 56)

The Report concluded that, where practicable, the firemen and deputies should give their whole time and attention to duties immediately concerned with safety and that, in the interests of discipline, they should be involved in the organization and supervision of the men rather than in the

manual work of production. But the Commissioners felt unable to recommend any definite rule on this matter.

The Coal Mines Act of 1911 translated many of the Commissioners' recommendations into law and, on the last point, ostensibly went a 'good deal further'. It stipulated that firemen and deputies should devote the whole of their working time to their statutory safety duties, but also provided for a range of exemptions from this rule. Small mines, employing less than 30 people below ground, were excluded, as were mines in the North East where deputies could still be employed on timbering at the face. Applicable to the industry as a whole, deputies could also be employed to 'measure-up deadwork' performed at the face, provided that this did not prevent them from conducting their safety duties in a thorough manner. Section 64 of the Act, and Rule 50 of the General Regulations codified in 1913, limited the maximum size of the deputy's underground district to that which it was possible to thoroughly inspect within a period of two hours. Section 15(1) set out the qualifications for the post, and added two requirements to those recommended by the Royal Commission. The deputies' were also to be examined on their ability to measure air in an air current, and on the condition of their hearing, before they obtained a certificate.

The examination for the position of fireman and deputy was therefore established primarily as a 'physical one', and its limitations were addressed by the Holland Committee appointed by the Secretary for Mines in the late 1920s. While deputies were to be tested for their ability to measure an air current, this was not normally part of their statutory duties. On the other hand, they were required to test the condition of 'roof and sides', with collapses at the face and in the roads one of the principal causes of deaths and injury in the mines, while the deputies'

examination did not provide for any test of candidates' ability to make such checks. The Holland Committee pointed to anomalies in the deputy's examination, and also to the failure of the Royal Commission and 1911 Act to stipulate any qualifications for the deputy's immediate superior - the colliery overman.

Deputies received their instructions from the overman, and the latter was the official left in charge of the mine in the absence of the manager and under-manager. In 1864, the Miners' National Association had petitioned parliament demanding that, 'all agents, overmen, or chief managers of mines be subjected to scientific examination, and that a certificate of competency be given by some qualified person, or Board of Examiners...previous to any mine being placed in their charge' (cited in Holland Committee, Report, 1930: 9). But the Acts of 1872 and 1887 had made no specific reference to colliery overmen, and the 1911 Act made a similar omission, so that these officials remained free from any statutory responsibility for safety.

The General Regulations under the 1911 Act went to arbitration in 1913, and at this juncture the Miners' Federation demanded that men appointed to the position of overman should be required to hold at least second-class certificates of competency. A rule stipulating that overmen should possess the second-class - or under-manager's - certificate was inserted, but the fireman's certificate was allowed as an alternative. Since the minimum age for promotion to this position was set at 23, with 3 years' practical experience below ground, men were appointed with less underground work experience and no greater technical training than the deputies who they supervised, and who were defined as production officials with no statutory responsibility for the safety of employees. The position in Britain, on the

eve of the First World War, was therefore in many respects quite different from that in the German coal industry where candidates for the position of 'steiger' - roughly equivalent to the overman in British mines - had to undergo a formal technical education and 'two gruelling years at the Bergschule' before they were eligible for promotion (Spencer, 1975: 183).

In the British industry, the anomalies left by the 1911 Act became more apparent with the introduction of coal-face machinery. But they were evident long before the extension of machine mining. While deputies were apparently confined to the performance of safety duties, the spirit of the legislation was never fully-realized in practice, and their role in the mines remained ambiguous.

> I'll try to put it to you as plain as I can.....Our first duty was safety. That came first - to see that the men were working in safe conditions. But it wasn't so simple. You know that if you have a business it has to make a profit. (Deputy, born 1890, cited in Forman, 1979:42)

The deputy was in charge of a district within the mine and, in the absence of any further development in the managerial hierarchy, remained the 'only feasible representative of managerial authority at the coalface' (Supple, 1987: 441). He had to 'keep things in order' and 'make the district pay' (Forman: 42), and if overmen were employed he had to accept their instructions, even if these overruled his decisions on the conditions of the workings and because his superior officer's duties were defined in terms of output maximization.

ORGANIZING THE DEPUTIES

Pay and Conditions

The British coal industry continued to draw its officials 'from the ranks' over the interwar period of this century with, according to Stewart, 'by far the greater number of managers' - over 90 per cent in Scotland - 'drawn directly from the ranks of the miners' in the 1930s (1935: 54). Government enquiries became increasingly critical of this situation and of the entry barriers into the managerial side of coal mining confronting 'men of general education not already having family connections with it' (Samuel Commission, Report, 1925: 190). But there were also barriers to promotion for mineworkers, and having ambitions may have been insufficient to pass through obstacles such as employer prejudice and nepotism and preference for men who could maintain discipline, rather than those who had pursued their education at night school or college.

Promotion to the first rung of the managerial hierarchy, moreover, was no guarantee of further elevation, while the pay and conditions attached to the job of fireman or deputy would have deterred many men from presenting themselves as candidates. Deputies worked for longer hours than other grades of underground workmen. The 1908 Act, which restricted the length of the working day to 8 hours for miners, contained the provision that the working shift of deputies, firemen and examiners could be extended to a maximum of 9½ hours. William Frowen, General Secretary of the General Federation of Deputies' Associations formed in 1910, argued before the Sankey Commission in 1919 that:

> It is a matter of regret to us that a large number of

> mine owners or mine managements have made this clause fit so that the 9½ hours has become the minimum, and the maximum has gone to any time you may mention. (Vol.1:Q.4793)

And the Royal Commission on Mines reported in 1909 that 'we had evidence from a number of witnesses to the effect that the firemen employed at many collieries work as much as eleven or twelve hours a day, and in some cases this limit is exceeded' (Second Report: 50). But obviously terms and conditions varied, and in the North East deputies were reported to work an average 7½ hour shift, or half an hour longer than other workers at the face (Sankey Evidence, 1919, Vol.1: QQ.4935-36).

Deputies were generally paid on a day-wage basis with, in some pits and a minority of districts before 1913, these officials in receipt of a weekly-wage. As with hours, there were regional variations in earnings. The Royal Commission on Mines received evidence of the low wages paid to firemen and deputies in a number of districts, and in the Scottish coalfields in particular. A number of witnesses suggested that since the earnings of these officials were below those of the piecework hewers who they supervised, the best qualified men were not attracted to the job, while the status of the firemen remained low and did not enable them to properly maintain discipline (Second Report: 41).

But not all witnesses were convinced that higher pay would elevate the deputy's status, or induce more suitable candidates to offer themselves for promotion. R.A.S.Redmayne, for example, who was subsequently appointed Chief Inspector of Mines, argued that while the deputies did not have the scope of the piece-work coal-getter to increase their daily earnings (by intensifying their effort), they did enjoy a greater security of employment

and a more regular income - the kind of benefits that might attract a 'steadier' and 'more reliable' candidate from management's point of view.

> Speaking from my own practical experience I have found that men have been ready to forego the possibility of higher wages (piecework at coal hewing) in favour of taking a deputy's job, because of its more congenial work and possibly more regular employment. It approximates nearer to a certain wage, and is not subject to considerable variations, whereas the coal hewer's wage is subject to considerable variation, especially if he gets into a hard place or has a bad bargain, or whatever it may be. (Second Report: 41).

The Lancashire deputy, cited by Forman, suggested that men with family commitments were more likely to opt for the official's position as he himself had done. He had six children and a wife to support - 'none of them working' - and he had sought promotion at a time when the pits were 'doing very badly', with short-time working prevalent in the industry while there was 'no dole' (1979: 43-4). The advantage of the deputy's job, as this man pointed out, was that it offered a 'guaranteed' working week; 'you had six days guaranteed - you had to work them - but there was no short time at all'. But not all deputies enjoyed the benefits of a weekly wage, and in Lancashire the six-day working week for deputies had been won through the activities of the deputies' union, rather than extended unilaterally by the mineowners.

The advantage of a regular income, as against the potential of higher earnings for piecework coal-getters, would vary with - amongst other factors - the state of trade.

> In peace-time when a collier may often, especially in summer, be working three or four shifts in a week, the deputy has a decided financial advantage for he

> is sure of six days' pay, but in war-time when the colliers' position is better in every way, it is hard work to find good deputies, and only men who can see well ahead will take the job. (Manley, 1947: 30)

Hence, difficulties were encountered in the recruitment of deputies during both World Wars and the years immediately preceding them. The Royal Commission on Mines concluded in 1909 that 'pecuniary inducements' would to a large extent regulate the calibre of candidates coming forward for promotion, and noted that current wage levels were often insufficient to attract the 'suitable' candidates for the job. The Commissioners recommended that this matter should receive 'the serious consideration of colliery owners' (Second Report: 46).

Deputies' Associations: Membership Growth to 1921

Pay and conditions formed the issues on which deputies began to organize in district and county trade unions from the early twentieth century. Hence, mineowners encountered pressure from 'above and below' to improve the pay and status of their subordinate officials. The period, of course, was one of union growth and of increasing labour militancy through British industry more generally, and widening earnings differentials between deputies and other grades in coal mining no doubt stimulated the efforts of supervisory workers in this trade to organize as a separate bargaining unit.

Thus, in the Midlands from the early twentieth century, deputies attempted to organize independently from the miners and from the associations representing higher levels of mine management. The latter were often hostile to the formation of separate organizations, representing the interests of supervisory grades, and this is made clear in England's (1963)

account of the Derbyshire Deputies' Association - which subsequently became the National Association, representing deputies across the coalfields of the Midlands. In certain other coalfields, however, and notably the North East, deputies were recruited into the mineworkers' union - and this situation was denounced by mineowners elsewhere in the industry, while government officials on the Royal Commission on Mines urged that in the interests of discipline it should be discouraged (Second Report:50).

Representatives of the early Derbyshire Association met with others from Nottinghamshire, Durham, Northumberland, Lancashire and Cheshire, and North Wales in 1910, and resolved to form a General - or national - Federation of Deputies' Associations. At this time in these coalfields only 4,080 out of the 11,300 deputies employed were in an association. In Derbyshire and Nottinghamshire, only 250 out of a total 4,000 deputies employed had joined the union. The South Wales' Examiners' Association affiliated to the General Federation in 1911, the year in which the Coal Mines Act was passed, defining the deputy's role as that of safety officer. The legislation, which elaborated the role and qualifications of firemen and deputies, boosted the self-image of these workers and fuelled their demands for pay levels commensurate with their responsibilities.

> Since 1911 he has been placed by Act of Parliament in a position dissimilar to any other person employed in the industry; he has to carry out the Mines Acts and Regulations, and see that others do the same;...
>
> It may be said that the 1911 Act was a safety Act in very deed, so far as the deputies were concerned, from that date he became a certificated man with added duties and far greater responsibilities.
>
> (Frowen, Sankey Evidence, 1919, Vol.1: Q.4793)

The Derbyshire Association of Deputies was renamed the National Association in 1913, and reconstituted to represent the Midlands' districts. Membership increased from 350 to 1,021 between 1912 and 1913, with the number of branches rising from 10 to 30 (17 in Derbyshire, 6 in Nottinghamshire, and 7 in South Staffordshire and Cannock Chase).

The National Association campaigned for an 8 hour day for deputies, and for pension schemes with this latter demand reflecting, possibly, the muted managerial aspirations of its membership. The Association also campaigned for deputies to be state employees, and for managers to be prevented from 'appointing' men to act as Deputies, who are not qualified to act, some being under age, or not having had the necessary experience, and some not holding a certificate' (England: 18). A further demand was for deputies to be given 14 days' notice before dismissal by their employer, 'so that in the event of any injustice being done to him, we can inquire into his case, and perhaps prevent his removal'. In 1913, the National was registered under the Trade Union Acts, and the first full-time official - a General Secretary - was appointed.

Membership of the National Association had increased to 1,654 by 1916. But while it had been in existence for 8 years, it still experienced 'great difficulty in obtaining recognition from coal owners' and only one pit agreement had been signed (England: 21). A breakthrough, however, came with the state's assumption of control over the coal industry in the First World War. With mounting unrest in the coal industry, the Coal Controller agreed to meet with the deputies' associations and in 1917, awarded an advance to these officials (which in the Midlands' area at least included the provision for one week's paid holiday). Government intervention thus nurtured the deputies' aspiration to be treated as a separate bargaining

group, with terms and conditions distinct from those of the general body of mineworkers. Membership of the National Association was boosted by these developments, and reached 2,860 in 1918, by which time the National had succeeded in 'making Agreements with the Coal Owners' Association in each Wages' District' in the Midlands coalfield (England: 26). Under the agreement reached with the Midland Counties Coal Owners' Association, deputies were paid 8s 6d per day for a 'guaranteed six-days' week'; gained 8 days paid holiday, payment for overtime, sickness and accidents; and a joint disputes committee was established. But these advances, which gave the Midlands' deputies many significant benefits in comparison with mineworkers, were not enjoyed by deputies throughout the industry and in some coalfields - notably in Scotland - the officials' unions were still struggling for employer recognition.

Meanwhile, the General Federation of Deputies' Associations had resolved to affiliate with the TUC, and to campaign for an 8 hour day for deputies throughout the industry, for these officials to be state employees, and for a national board of appeal for those dismissed by their employers (see below). In evidence to the Sankey Commission in 1919, the General Secretary - William Frowen - claimed that the General Federation represented 20,000 of the 24,000 deputies employed in the British coal industry (Vol.1: Q.4793). This would appear to be something of an over-estimate, however, and Frowen's figures were certainly questioned by representatives of the MFGB on the Commission (Q.5044). According to England, the deputies' associations were still very weak in certain districts, and were fighting for recognition in the face not only of employer hostility, but also opposition from other managerial associations and, in Scotland, from the mineworkers' union.

Employer Responses to the Organization of Supervisory Grades

Firemen, examiners and deputies occupied a 'peculiar position' in the mining industry, standing between the mine owner or management and the mineworker (Frowen, Sankey Evidence, Vol.1). They were the officials in closest daily contact with the miners, and 'management experts' stressed the 'paramount importance of a staff of loyal and capable overmen and deputies' since these officials were 'in constant contact with the workmen in a way that the manager cannot be' (Bulman,1920: 16). Supervisors were the representatives of managerial authority in the workplace and were expected to execute managerial instructions, while they were also employees and subject to similar pressures experienced by the men in their command. Managements demanded the loyalty of their under-officials. But in the British coal industry employers were often reluctant to extend the material rewards and benefits that would differentiate supervisors from other grades of employees, and enlist their devotion to the company.

In the German coal industry of the Ruhr, firms had developed a variety of means to secure the loyalties of their supervisory workers (see Spencer, 1975). Only candidates with appropriate political sympathies were promoted to supervisory positions. Supervisory grades were paid well above the average earnings of the workmen, and received certain fringe benefits such as superior company housing, while the lengthy, formal training that they were compelled to undergo was also regarded in part as a means through which supervisors would be differentiated from the workmen, and their attitudes and loyalties oriented towards the company.

In the British industry, in contrast, overmen and deputies were not obliged to go through any formal technical training; mineowners insisting that practical experience was sufficient for the duties performed by their

subordinate officers. And successive Royal Commissions drew attention to the relatively low pay and low status of firemen and deputies at the average colliery, in spite of the responsibilities for safety devolved to these workers by the 1911 Coal Mines Act. Managements demanded the devotion of their supervisory staff and, writing in 1920, Bulman suggested that in the past, 'they have been the pick of the mining community, capable men of character and self-respect, and of special competency in practical mining work, and distinguished, many of them, by a splendid sense of devotion to duty'. Notwithstanding the problems with this summation, Bulman's account does highlight the alarm with which owners and managements viewed developments in the years immediately succeeding the First World War, when labour militancy was at a height in Britain (3). Thus, he continued that in recent years there had been 'symptoms of dissatisfaction and unrest' among the deputies, and that this had arisen 'very naturally from the higher wages earned by hewers and stonemen on piecework, by the disturbing effect of recent legislation, and by the growing strength of the Miners' Union' (p.16).

The unity and militancy of the miners' union was growing, and the MFGB was pursuing the campaign for the nationalization of the coal industry. Deputies were organizing and their unions were recruiting increasing numbers, while - and most ominously for employers - the deputies' associations were working closely with the mineworkers' unions on a number of issues. Deputies had to be kept 'entirely independent of the Miners' Union', Bulman insisted, for they were 'part of the official staff' of the colliery and essential to its 'successful working', and therefore owners would have to improve the pay and status of these officials in order to steer them away from politically informed trade unionism. The Editor of the

Colliery Guardian intimated similarly to his readers that the reward of deputies had been 'niggardly', that many of them 'earn less in wages than the boys', and that 'a real deal depends upon the way in which they are treated now' (25.4.1919: 961).

But not all employers had passively witnessed the growth of trade unionism among their supervisory grades. Thus, the complaint articulated by representatives of the deputies' associations was that their members were being forced into company unions, organized by senior management. The annual report of the National Association of Deputies in the Midlands in 1916 suggested that:

> One of our greatest dangers now against our immediate success is the action of the Management in offering to assist the Deputy into a Union of Deputies at his own particular Colliery. They have never been interested in the Deputy until they see him begin to organise into a very useful Union of his own..Now it suddenly occurs to the Management that it would be much better if he were organised under the Manager's control. Organise, they say, make the Manager the Vice-President, the Agent the President, the Under-Manager the Secretary and Treasurer...If you have a dispute a Committee chosen from amongst us can go into the matter, and settle without interference. Thus saith the Manager. We ask you seriously to contemplate what influence the Deputy would have in settling the dispute to his....way of thinking, by a Committee which included in its composition the Agent, Manager and Under-Manager. Some have tried it for a year or so, but are sick of it. They are coming back. Did wenot find at our very commencement, we could not do any good for the Deputy while we had Under-Managers with us? Beware of the wolf in sheep's clothing.
> (cited in England:22)

Thus, while mineowners were anxious to dissuade their deputies from joining with the mineworkers' union, in several districts they were equally

concerned to dissuade deputies from organizing in independent associations, outside the control of colliery management.

Owners and managers attempted to head-off such a development either, as in Scotland, by refusing to recognize the deputies' unions, or, as in Yorkshire and elsewhere, by 'fostering private schemes with a condition that no deputy should be a member of a Union' (England:24). Such schemes might offer the inducements of higher wages and fringe benefits - better housing, paid leave and sick pay - to men who remained loyal to the company, or at least remained outside the deputies' association. Yorkshire mineowners and employers in a number of Midlands' districts would appear to have been particularly active in promoting 'tied schemes' in the 1920s. But similar practices were reported elsewhere. For example, at a meeting of the South Wales Colliery Officials' Union in 1919, it was claimed that 'the owners encouraged disorganisation by giving higher wages to those outside the Union, the object being to smash it' (cited in *Colliery Guardian*, 25.4.1919: 970).

The deputies' associations campaigned vigorously against such employer interference (4). The General Federation of Deputies' Associations pressed for the right to form independent trade unions in its representations to the Government in the years between 1919 and 1922. In this the Federation was supported by the TUC and by the Miners' Federation (5). A deputation from the MFGB, the Parliamentary Committee of the TUC, and other mining organizations, met with the Home Secretary in February 1920, and Mr Clarney, on behalf of the deputies', argued for:

> ....immediate steps to ensure coal owners of Great Britain shall withdraw any scheme which prevents deputies, firemen or examiners from enjoying the full privilege of trade Unionists. (cited in *Colliery Guardian*, 6.2.1920:394)

Clarney stated that colliery owners were 'introducing benefit schemes, and if a colliery deputy was a trade unionist he could not participate'. A similar complaint was made to the Secretary for Mines in 1922, and in that year the Trades Union Congress, meeting at Southport, described as 'insidious the attempts on the part of coal owners and other employers to prevent trade union organisation amongst professional, technical, supervisory, clerical and other workers'. A resolution was passed condemning the 'institution by employers of superannuation, pension, and other benefit schemes the membership of which was conditional upon an undertaking being given not to become or remain members of a recognised bona-fide trade union' (cited in *Colliery Guardian*, 8.9.1922:586).

In the years immediately succeeding the First World War, such employer practices were to an extent counter-productive. Membership of the deputies' associations increased while the MFGB supported the deputies in their demands, and relationships between the mineworkers' and deputies' Federations became closer. In 1919, the MFGB claimed a 30 per cent advance on standard wage rates, and a reduction in the length of the working day, and the Deputies' Federation made similar demands before the Sankey Commission of that year. Unlike the MFGB, however, the deputies did not pursue industry-wide wage agreements, and their associations did not formally unite around the demand for the nationalization of the industry.

The Sankey Award conceded a reduction in the length of the working day for mineworkers (from 8 to 7 hours) and for firemen and deputies (from 9½ to 8 hours). Subsequently, the National (or Midlands) Association of Deputies moved a resolution at a conference of the General Federation for the latter body to apply for affiliation with the Miners' Federation. The resolution was passed by 90 votes to 64, but according to England (1963:26)

the application for affiliation with the MFGB was dropped on receipt of a letter - the contents of which remain obscure - from Frank Hodges of the Miners' Federation. Evidently the moves to join with the mineworkers had created certain tensions within the deputies' organization, and had tested members' self-image and aspirations, their loyalties to colliery management and/or fear of employer disapproval. In any event, the South Staffordshire and Cannock Chase Deputies' Association broke from the National in 1919.

Union Membership Decline, 1921-1935

The 'peculiar position' of the deputies - between management and the mineworker - was reflected in their attitudes towards trade unionism in general, and towards unity with the mineworkers in particular, with the latter displayed in their activities during the disputes of 1920, 1921 and 1926. Under the 1911 Act, deputies had certain statutory safety duties to perform and their position in this respect was a factor in the efforts of mineowners and mineworkers to enlist their loyalties and support. If the deputies went on strike in support of the miners, the difficulties of the mineowners in keeping the pits open - with the aid of scab labour - would be considerably increased. In 1920, the deputies put forward a wage claim in line with that demanded by the MFGB, and the *Colliery Guardian* ran an article under the ominous headline, 'Deputies to Support Miners' (27.8.1920: 596). With a stoppage of work imminent, a National Conference of the Deputies' Federation was held to determine the action to be taken by its members. The attention of delegates was drawn to a standing resolution stipulating that, in the event of a dispute between the owners and workmen, the pits would be kept open during negotiations for the performance of such duties as pertained to the position of firemen, examiners and deputies.

Some objection was raised to this, but one delegate countered that 'we are citizens as well as trade unionists' (Ibid).

Frowen claimed, as General Secretary of the Deputies' Federation, to speak on behalf of the vast majority of these officials in the early 1920s. But a significant proportion of deputies were unorganized or organized in employers' 'tied schemes', while most experienced contradictory pressures. Their loyalties were strained between their own union, the miners with whom they worked and from whose ranks they had risen, and their employers who could determine their future employment prospects. Conscious of their role and responsibilities, deputies were also often anxious to display to the outside world that they were moderate and responsible men. Variations in work organization and in employer practices often caused their loyalties to be stretched in different ways across the coalfields as a whole. Thus, while they ostensibly formed a more homogeneous group than the mineworkers, their unions exhibited complex internal divisions and were never successful in the interwar period in organizing all deputies employed in the coal industry. In the miners lockout of 1921, for example, and as regards the Midlands area alone, many deputies 'remained at work, whilst permission was granted for safety men to work at certain pits' while at others 'a large number of Deputies in the County were out for the whole period of 13 weeks' (England: 27). And, following this dispute, the membership of the National Association began to decline, as did that of the General Federation.

The position of the deputies in the Midlands area in the miners' lockout and general strike of 1926 was 'very confusing' (England: 29). At some pits, all the deputies were on strike, while at others they all remained at work. Membership of the National Association fell, from 3,303 in 1921, to 2,139 at the beginning of 1926, and to 1,893 by the end of that year, while

'to the everlasting shame of those concerned', many deputies joined with the Spencer (or purportedly non-political) Union (Ibid; and see chapter 4). Membership of the National continued to decline over the late 1920s and through the years of recession in the coal industry, with only 877 left in the Midlands association in 1935. A similar membership decline was registered by the General Federation, with Frowen claiming in the mid-1930s to represent between 14,000 and 15,000 deputies in the British coal industry (Royal Commission on Safety, Evidence, 1938: QQ 15309-11).

Unemployment in the coalfields clearly took its toll, while employers in the Midlands and in the Yorkshire coalfield initiated a more concerted campaign to disorganize the deputies from 1926. While County Agreements negotiated in 1918 remained in existence, 'conditions were now favourable for the owners to break the negotiating power of the Association' (England: 30). Some firms offered 'private agreements', conditional upon the deputies withdrawal from the union, while others allowed union membership but withdrew from collective agreements covering the coalfield as a whole.

> Some pits could have a private Union, some sold their freedom for a blue suit (value £3) per year, others were offered a small pension - anything to persuade Deputies to become disorganised, and the membership figures reveal how many fell for the bait. (England: 31)

Mineowners in the Midlands would appear to have been particularly assertive in this respect, and the Royal Commission on Safety in the Mines, which reported in 1938, noted and deprecated the attitude and practices of 'certain owners, especially in the Yorkshire and North Midlands coalfields, in instituting schemes of employment for their deputies which, while granting these officials certain benefits by way of special sickness pay

and pension rights, have the effect of excluding them from participating in any collective organisation of their own' (Report: 202).

The Commissioners were also critical of the situation in the North East, however, where deputies at some pits remained in the miners' union. Changes in the organization of production over the interwar period were transforming the deputy's role and the nature of supervisor-worker relations at the coalface. The transition to machine mining expanded the need for close supervision at the coalface, and pressure had been brought to bear on deputies to concern themselves increasingly with discipline and labour control, even though this elaboration of the deputy's role was in breach of the 1911 Act. The Royal Commission on Safety in 1938 urged that the legislation should be changed, so that deputies would legally be able to undertake duties which in many pits had in practice been foisted on them. In other words, the Commissioners considered that the needs of production should be prioritized - over considerations of safety - and it was from this perspective that they were highly critical of current employment practices in the industry. They argued that deputies had not been given a sufficiently authoritative status for the proper exercise of their responsibilities, that their wages had generally been too low relative to the earnings of the men they supervised, and that henceforward terms and conditions would have to be improved to emphasize the rank and managerial authority of the deputy - or to define the deputy unambiguously as a production foreman (Report, 1938:201-2).

State Employment and Boards of Appeal

The Royal Commission on Safety, which reported at the end of the interwar period, recommended that terms and conditions of employment for colliery

deputies should be improved and so that the status of these officials would be elevated and they would be seen to have the necessary authority to behave as production foremen at the face. For many years, however, the deputies had campaigned through their associations to be made state employees, and so that their authority in relation to higher levels of management would be buttressed and they would be better placed to discharge their principal responsibility for safety under the 1911 Act.

In 1911, and following the passage of this Act, the newly-formed General Federation of Deputies' Associations had met with Winston Churchill, then Home Secretary, and attempted to impress upon him that deputies should be 'state employed and controlled' (Frowen, Sankey Evidence, 1919, Vol.1: Q.4857; see also England, 1963:15). The Federation continued to pursue this demand through the period to the late 1920s. Frowen, the Federation's General Secretary, had elaborated on its basis before the Sankey Commission in 1919.

> .....the deputy is between the mine owner and the workman. At the same time, he is appointed and controlled and paid by the mine owner. I certainly believe that this is a bad omen for matters of safety. That is, so far as the owners are concerned. (Vol.1: Q. 4854)

Deputies could be dismissed or demoted by their employer for failing to priortize production over safety. If they were employed by the state, *Frowen argued, their job security and* ability to perform their statutory safety duties would be enhanced, since they would be responsible 'to a public body' rather than to the mineowner.

The Miners' Federation supported the deputies in their demand to be state employees. The MFGB's preferred position was for safety officers in the

mines to be elected through a ballot of the workforce. But if deputies were employed by the state, employer discretion and ability to prioritize production over the safety of mineworkers would be restricted, and the deputies' demand was obviously in line with that of the MFGB's for the nationalization of the industry. Mine owners, however, were vigorously opposed to the deputies' claim and succeeded in resisting it while the industry remained under private ownership - in other words, for a further 28 years.

The General Federation of Deputies' Associations had affiliated to the TUC in 1918, and in the following year a resolution was passed at the annual Congress calling for colliery deputies to be made state employees (Colliery Guardian, 5.9.1919:635). A deputation from the Parliamentary Committee, the MFGB, and the General Federation of Deputies, presented this demand to the Home Secretary in February, 1920. On behalf of the deputies, Frowen also requested the establishment of an independent board of appeal to investigate claims from firemen, examiners and deputies of unfair dismissal - or for persuing their statutory responsibilities in contradiction to managerial instruction (*Colliery Guardian*, 6.2.1920:394). But these demands were rejected in 1920, and again in 1922 when the Secretary for Mines stated that the Government was opposed to the creation of a 'dual responsibility for safety in the mines'. Under the Mines Acts, it was argued, colliery managers were responsible for the safety of employees, and the government would not intervene to diminish this responsibility - or, by implication, managerial authority.

After the miners' lockout in 1921, the Deputies' Federation ceased to act with the MFGB in its representations to government. But the General Federation continued to press for its members to be made state employees,

and presented this demand before the Samuel Commission in 1925. But again the deputies' were rebuffed, with the Commission's Report stating that:

> The personal responsibility of the colliery manager, implying his personal control, is and should remain the corner-stone of the safety regulations. The division of responsibility between him and a class of independent deputies would be a step in the wrong direction. (p.189)

The basis of the deputies' claim, of course, was that managers had dual responsibilities - for output and for safety - and acting under pressure from boards of directors were often compelled to prioritize the former. Deputies were responsible for safety, and could also be prosecuted or fined for failing to enforce the provisions of the Coal Mines Acts. But they were employees of the company, and were liable to be dismissed or demoted for failing to conform with its priorities, or for taking action in the interests of safety which had the effect of retarding production.

Frowen submitted evidence on behalf of the General Federation of Deputies to the Royal Commission on Safety, appointed in 1936. By this time, the Federation had dropped the demand for deputies to be state employees, but was continuing to insist on an independent, national board of appeal. Frowen's evidence suggests that the piecemeal transition to machine mining and worsening economic performance of the coal industry had exacerbated the problems encountered by colliery deputies in fulfilling their statutory safety duties. In contrast with his earlier submission to the Sankey Commission, Frowen now identified the principal problem as managerial pressure to maximize output and cut costs. Thus he argued that:

> The whole cause for asking for a Board of Appeal is because the managers as a whole have made so much of the output side. They have moved the balance (between

> safety and output) and made it an unholy balance. I want to say at once that this does not apply to every manager, but it applies so much that we have tremendous complaints from practically every coalfield.
> (Minutes of Evidence, 1938: Q. 15498)

Representatives of the mineowners, however, were as vehemently opposed to the creation of a board of appeal as they had formerly been to the principle of state employment. They argued that the mine manager would be placed in 'an intolerable position if his dismissal of a deputy on grounds of incompetence could be called into question and possibly reversed'. They claimed that the detrimental effect on discipline that would result from such an incursion of managerial prerogative would be 'far more prejudicial to safety generally than an occasional miscarriage of fair treatment'.

Mechanization in the interwar period introduced new safety hazards for underground workers. For employers, it expanded the need to maintain supervision at the face. These developments formed the substance of the Royal Commission's investigations, and the Commissioners acknowledged that deputies had been subjected to new pressures. The deputy's superior in the mines, the colliery overman, was responsible for output maximization and could override safety considerations. Deputies who objected to this order of priorities might simply be ignored, or perhaps dismissed. Acknowledging these difficulties, the Royal Commission in 1938 nevertheless ruled that the employer's right to hire and fire must remain sacrosanct. The deputies' demand for an independent board of appeal with the powers to reinstate officials who had been unfairly dismissed was therefore rejected, and the Commissioners would only concede that in certain circumstances a 'private inquiry' might be conducted by the divisional inspector of mines, who could

'advise' mineowners as to an appropriate course of action.

MECHANIZATION IN THE MINES IN THE INTERWAR YEARS

Re-defining the Deputy's Role

The twentieth century saw the gradual introduction of mechanization to the production process of coalmining. The partially-mechanized mining system, introduced in the interwar years, created fresh problems of labour management for employers (see chapter 5). Under the unit system, or mechanized longwall method, the collier's traditional craft job was fragemented into a series of narrowly-defined job roles. Detailed tasks were arranged in rigid sequence over three separate shifts, and a 24 hour cycle of intensive operations was instituted at the face. The introduction of coal-cutting machinery and increased division of labour under the unit system de-skilled the colliers and eroded their self-discipline. It expanded the need for supervision at the face, and management was forced to assume the function of coordinating the collective labour process. Mechanization also expanded the need for supervision in the sense of labour control and coercion. Tasks and shifts were interdependent. No shift could begin until work on the preceding one had been completed, while delays on any one shift could have a magnified disruptive effect through the cycle of coal-getting operations as a whole. Mechanization, 'with its regular cycle of intensive operations', therefore 'developed the need for closer supervision of the rate and amount of work done' (Royal Commission on Safety, Report, 1938: 183).

Mechanization also introduced new safety hazards and developed the need for increased supervision of the condition of the underground working area of the mine. The more rapid rate of advance of the face increased the rate at which fire-damp was emitted and made improved air flows essential, while the increased use of electricity heightened the risk of explosions. In the cramped conditions at the face, the introduction of machinery presented new sources of accidents and injury. The increased volume of coal dust produced by the machines exacerbated the risk of dust-related diseases and damage to eyesight. The noise created by the machines made it more difficult for workers to detect impending dangers, although this was essential if catastrophes were to be averted.

Mechanization therefore expanded the need for supervision at the face, from the point of view of production and of safety. Yet, available statistical evidence does not lend support to the proposition that its advance over the interwar period was matched by a very large increase in the number of supervisory workers employed in the coal industry (cf Goldthorpe, 1959). Evidence presented to the Samuel Commission in 1925 suggested that the number of supervisory workers employed in the industry, and the relative importance of these grades as a proportion of the total underground workforce, had increased over the first quarter of the twentieth century. But this increase cannot be attributed simply to the use of machinery, since 'it had gone a long way before the output from mechanized mines represented as much as a quarter of the total' (Royal Commission on Safety, Report, 1938: 51).

The Departmental Committee appointed by the Secretary for Mines to 'inquire into the qualifications and recruitment of officials' (hereafter, the Holland Committee) estimated in 1930 that approximately 28,000 firemen,

examiners and deputies were employed in the British coal industry. The Samuel Commission's figures suggested a roughly equivalent number in 1924, (although of course employment in the mines had fallen in the years between 1924 and 1928, as unemployment in the coalfields increased and short-time working became prevalent). The Samuel Commission reported that 4,295 colliery overmen were employed in the industry in 1924. But neither the Holland Committee nor the Royal Commission on Safety, which reported in 1938, supplied any statistical data on this particular grade.

Supple's figures, taken from the annual censuses and relating to the period 1921-31, reveal the persistence of regional variations in the numerical significance of supervisory officials. His figures embrace deputies and overmen and suggest that the proportion of miners classed as 'subordinate superintending staff' had increased in Nottinghamshire (from 5.1 to 5.3 per cent), remained stable (at 5.1 per cent) in Northumberland, but had actully fallen in most other major districts. This decline was most dramatic in Glamorgan and Monmouthshire (from 3.3 and 3.4 to 2.7 and 3.0 per cent). But mechanization had made little progress in South Wales. In 1938 only 26 per cent of that coalfield's output was undercut by machinery, and less than a third of pits employed mechanical coal-cutters and conveyors. Between 1927 and 1938, the proportion of British coal output cut mechanically increased from 23 to approximately 60 per cent, although the increase was largely accounted for by an extension of machine mining in mechanized pits rather than the conversion of hand-getting pits to machine mining. Unfortunately, there are no published statistical data on the employment of supervisory workers in the coal industry for the 1930s, let alone data on the numerical significance of supervisory grades at the level of individual pits.

The relevant literature of the interwar period is consistent in reporting an increase in the volume of supervision at the face with the introduction of machine mining, although for some mining engineers neither the volume nor the calibre of supervision at the 'average' pit was sufficient. These technical experts stressed that efficient organization and supervision were the key ingredients for 'successful' machine mining - defined in terms of output maximization (Mavor, 1924; Bulman and Redmayne, 1951; Barraclough, 1927-8). But some engineers tried to encourage mine owners by suggesting that machine mining facilitated close supervision and hence could be imposed without drastically increasing overheads, or the number of 'on-cost' supervisory officials employed. Giving evidence before the Royal Commission on Safety, the various Inspectors of Mines summarized the main changes in working methods since the 1911 Coal Mines Act in the term 'concentration'.

> This term generally implies the getting of a large output from a comparatively short working face divided into units of suitable length, each of which must produce a definite quantity of coal daily. This is effected by the use of coal-cutters and face conveyors together with, in many cases, gate conveyors or gate-end loaders.
> (Minutes of Evidence, 1938: 188) (6)

With machine mining, labour was concentrated within the mine, with up to 100 men employed (over the three shifts) on each unit of working face, and in order to secure a large daily output from a relatively small working area. As some commentators suggested, this meant that 'close supervision can be effected at a reduced cost per ton' (Barraclough, 1927-8: 194; see also Mavor, 1924).

Machine mining demanded closer supervision than on hand-worked faces. But mineowners and managements were anxious to minimize overheads, particularly when profits were squeezed and demand was depressed. One way in which this dilemma could be resolved, and the expense of employing a new layer of supervisory personnel obviated, was by delegating the function of labour control to an existing staff of colliery deputies. Thus, while the 1911 Act apparently confined deputies to the performance of statutory safety duties, there is considerable evidence to support the view of the Permanent Secretary at the Department of Mines that, by the mid-to-late 1930s, the provisions of the Act were increasingly 'honoured in the breach' (Royal Commission on Safety, Evidence, 1938: 7, Q33?).

Of course, the sentiment of the Act had not been fully translated into practice at many mines, even before the extension of machine mining. Over and beyond the various exemption clauses - applying to small mines, the Northern coalfield, and the task of 'measuring-up' - deputies performed certain production duties. They had a coordinating role, and had to ensure a regular supply of tubs and materials to the face, which involved them in the supervision of haulage workers, while they had to maintain discipline in their district. But while Frowen complained to the Sankey Commission in 1919 that his members were often placed in an impossible position because of the pressure from management and from mineworkers to neglect their obligation to enforce safety regulations, by the mid-to-late 1930s he was articulating a different problem. Pressure was exerted primarily by management and not simply for deputies to subordinate safety considerations to output, but to become actively involved in labour control at the face and in the interests of increasing production. The deputies, Frowen confirmed, were 'more speeded-up in their production than ever they have

been'. They were not 'spending the time that they should be on safety' because they were 'being forced on to output' (Royal Commission on Safety, Evidence: QQ. 15701-2).

In this sense, then, many deputies had been 'functionally upgraded', or thrust into a role where they had to be the collier's superior in more than a formal sense, and had to 'constantly *act* as his superior' (Goldthorpe, 1959: 218). Various commentators suggested that, in the interwar period, the deputy had become 'what amounts to a coal-face foreman' (Pick, 1946: 77) and, charged with the responsibility for imposing a fresh work discipline, they were now more immediately identified by mineworkers as part of management. With mechanical coal-cutting and the cycle system of production, the scope for supervisor-worker conflict at the face was greatly enhanced. Supervisors had to maintain the continuity of production and ensure that a definite amount of work was completed on each shift, while circumstances were continually arising underground tending towards the disruption of output (Mitchell, 1933; Trist and Bamforth, 1951). This must inevitably have produced stress and strain for the personnel involved, and may in part account for the difficulties encountered by firms in the 1930s in attracting recruits for promotion to the position of fireman, examiner or deputy (Royal Commission on Safety, Report, 1938).

But while deputies had been 'functionally upgraded' and had to supervise the rate and amount of work done at the face, like the faceworkers they experienced the 'speed-up' or intensification of work. And the available evidence suggests that there had been no commensurate improvement in their pay and conditions with their additional responsibilities; a discrepancy which, according to the Royal Commission on Safety, did little to elevate the status of deputies, or their authority in relation to mineworkers.

Moreover, the nature of their regrading clearly demonstrates the priorities of mineowners and managements. The interests of production were pursued at the expense of safety, and in spite of the additional dangers introduced with coalface machinery. Thus, while the deputies were being 'forced on to output', they also complained of 'interference' from other officials and from the colliery overmen in particular, since the latter were superior to the deputies and were appointed with the unambiguous responsibility for output maximization.

Colliery Overmen

Overmen occupied a position in the managerial hierarchy between the firemen, examiners, or deputies, and the under-manager or manager of the mine. While the term overman was usually employed, officials occupying such an intermediate position were also known as overlooker, under-looker, bailiff, or gaffer. The Coal Mines Act of 1911 had not specifically referred to this class of official; according to the Holland Committee because the overman's duties 'are largely production and not safety duties' and had therefore been considered to be outside the proper scope of the legislators. Thus while these officials might be left in charge of the mine in the absence of the under-manager and manager, they had no statutory responsibility for safety, and of all the general officials of the mine, 'the position of the person who is superior to the firemen, examiners and deputies, but inferior to the under-manager (was) least defined' in mine safety law (Holland Committee, Report, 1930: 67).

The position of colliery overman has been given prominence in analyses of the transition to machine mining. For example, the Royal Commission on Safety noted that mechanization expanded the need for close supervision at

the face and that deputies were constrained by the 1911 Act from undertaking such work, and suggested that firms had sought to overcome this problem by appointing overmen - or officials without statutory safety duties - to 'look after production' (Report, 1938: 183). But colliery overmen did not represent a new level in the managerial hierarchy, inserted only with the introduction of coal-cutting machinery, and the available statistical evidence suggests that the increase in the employment of this class of official - as with the lower grade of deputy - occured in the first quarter of the twentieth century. In 1913, approximately 3,000 overmen were employed in the British industry (representing 0.4 per cent of the total employed below ground). By 1924, the number had risen to 4,295 and the proportion to 0.5 per cent of the total underground workforce (Samuel Commission, 1919, Vol.3: 197).

The colliery overman was 'overseer of a fairly large area in a mine' (Parry Jones, 1925: 51). He was generally appointed in charge of two or more deputy's districts and was responsible for satisfactory working and good discipline in that area' (Bulman and Redmayne, 1951: 72). Bulman and Redmayne argued that such officials formed the 'backbone of colliery underground management'. But mine managers were not legally obliged to appoint such officials, and in small mines there may have been no intermediary between the deputy and the manager. On the other hand, it was common practice for larger mines to employ overmen (Royal Commission on Safety, Evidence: Q.23880), and there may have been some specialization of function with overmen appointed to take charge of different departments, although this would also reflect regional variations in geological conditions and in work organization.

...e.g. the master-shifter - as he is called in the Northern

> district - who supervises the shifters and stonemen, who do the repairing and stonework, when the pit is not drawing coals; and the master-wasteman, who is responsible for the maintenance of the return airways. (Bulman, 1920: 15)

A back-overman may have been appointed to supervise work on the back-shift, and would have been the official left in charge of the mine in the absence of the manager or under-manager.

The overman was a production official, and had no statutory responsibility for safety, even though he was often the official left in charge of the mine when work was in progress and 'the directions which he issues must necessarily involve safety measures' (Holland Committee, 1930: 103). One of his principal duties was to measure-up 'deadwork' at the face, and haggle with the colliers over payment for work in 'abnormal' places. But evidently the overman's powers and scope for the exercise of independent initiative had been progressively circumscribed - in larger collieries at least - from the beginning of this century. Jevons (1920) describes how larger firms introduced centralized cost-accounting techniques from the end of the nineteenth century, and were in this way able to place overmen in competition to maximize output and minimize expenditure in their respective underground districts. Firms were better placed to monitor the performance of different underground districts, while they also offered incentives - 'a substantial cash prize in one instance...but in any case first promotion' - to those officials who were most resistant to the claims from the colliers and most successful in minimizing deadwork payments (p.528).

In most coalfields it was customary for colliers to be paid an 'allowance' for coal-getting in an 'abnormal' place, or where geological

conditions made it difficult for them to make average earnings. In South Wales, from the early twentieth century, firms attempted to reduce costs by whittling-down these 'consideration payments'. Mine owners were experiencing intensified international competition, while labour productivity in the coalfield was deteriorating and, as Jevons pointed out, an attempt to cut costs by paring down consideration payments was a more attractive option for employers than a direct assault on wage-rates. With the latter, they would have to deal directly with organised labour, while with the former they 'had to deal with the men only as individuals' (p.527).

Some firms adopted the practice of simply setting a fixed maximum sum, so that on 'measuring-up day' managers and under-officials could not exceed this level and were forced to reject a proportion of claims from the mineworkers. Overmen were compelled in consequence to rely on devices other than financial incentives to get the work done.

> Overmen in years gone by had a considerable amount of authority over their respective areas. The enjoyed full power to make a settlement when abnormality prevailed.... ...Great changes have taken place in that respect. As one rustic summarized: "The overman has been plucked of so many feathers, power is only left him to grant 'tuppence' per ton allowance and so much as he can deliver of his 'bloomin' cheek'". (Parry Jones, 1925: 51-2)

Colliers in turn were forced to work harder, 'sometimes beyond their strength, when they found themselves in an abnormal place' (Arnot, 1953: 58-9).

The South Wales Miners Federation took up the issue of payments for work in abnormal places, and backed a test case brought by a collier from Ynysybwl against the Ocean Coal Company in 1907. The claim at court was for

payment of an allowance on the grounds that such payments were customary. But Judge Bryn Roberts ruled that allowances not specifically provided for in the piecework price lists were mere gratuities and were not recoverable at law. The decision, Jevons reported, precipitated the extension of this method of cost-cutting to 'practically all the larger companies', while the statutory reduction in the length of the working day in 1908 further fuelled the owners' commitment to such practices. Determined to impose their policies, the management of the Naval Colliery Company - in turn owned by the Cambrian Combine - locked-out all 800 employees at their Ely pit in 1910, when a section of the colliers refused to accept the company's price for work in a new and particularly difficult seam. The dispute spread, across the coalfield, and eventually to unite all mineworkers in the demand for a minimum wage and the strike of 1912.

Nevertheless, the change in management organization and practice was a continuing trend, and by the late 1930s Frowen was referring to colliery overmen as 'officers of economy'. On behalf of the colliery deputies, he submitted to the Royal Commission on Safety that overmen were 'next to the under-manager, and they get their paper from head office of the costs and all that kind of thing, and their whole time seems to be taken-up with that side of mining' (Evidence, 1938: Q.15,511). Overmen were production officials and were immediately above the deputies in the management hierarchy, and aside from the changes in production methods, deteriorating profitability in the industry over the 1920s and 30s provided the context for increasing friction between the deputies and their immediate superiors. Hence, Frowen's complaint that deputies were often unable to discharge their statutory safety duties because of 'a number of conflicting interests, and interferences by persons with no legal responsibility, whose

chief concern is to maintain the output of coal or keep the working costs down at times when it is almost a vital question for the deputy whether the lives of the workmen are being endangered or not' (Ibid:p.554). A greater expenditure on timber might be required, in the interests of safety. But this would conflict with the overman's function of cost reduction. Deputies were required to close-off an underground area if they considered it to be unsafe. But this would conflict with the overman's job of maintaining output and Frowen complained that, 'we have had cases where a deputy has withdrawn the men and marked the place off, and another official has pushed the thing back and taken the men in again' (Ibid: Q. 15,554).

The Coal Mines Act, 1911, did not explicitly refer to the position of overman and hence left this official without any statutory obligation for the safety of employees. Only minimal qualifications were laid down for the post after the General Regulations went to arbitration in 1913. Candidates had to be at least 23 years of age, with at least 3 years' practical underground work experience, and to be holders of a second-class certificate of competency or a fireman's certificate. The Act left an obvious anomaly, identified by successive government enquiries and condemned by the Miners' Federation. Firemen were required to be at least 25 years of age, with a minimum of 5 years' underground work experience, and hence might be better qualified - in terms of practical experience - than their immediate superiors. A survey conducted by the Mines Department in 1921 and embracing 85 per cent of UK mines, revealed that in the vast majority of cases firemen and deputies were also better qualified in terms of their formal,technical training. Thus, the survey revealed that 2,488 persons holding certificates of competency were employed in positions inferior to that of under-manager at the mines surveyed. Of this total,

only 754 were overmen. Since 2,827 overmen were employed at the mines covered by the survey, this meant that less than 27 per cent of this class of official were holders of first or second class certificates of competency.

The Miners' Federation argued that since overmen were superior to the firemen and deputies in the management hierarchy, they should possess a superior qualification and at least a second-class (or under-manager's) certificate. But mineowners protested that practical experience and the ability to maintain discipline were sufficient qualifications for this official, and that to insist upon a technical qualification would 'unduly restrict the field from which the employer can make his choice and...tend to the exclusion of the type of person who, though competent for the work which devolves upon him, seldom possesses the necessary education to equip him to undergo a searching examination test' (cited in Holland Committee, Report, 1930: 68). Given that the 1911 Act stipulated that the examination for the second class certificate should be suitable for the 'practical working miner', the employers' position would appear to be extremely weak. But while the MFGB argued that many miners who had passed the under-managers examination found it impossible to secure promotion, the employers maintained that this was because such men lacked the requisite skills for the position of colliery overman.

The weak provisions of the 1911 Act obviously did offer employers maximum scope in the selection of their subordinate officers, and allowed them to select candidates who had displayed their loyalty to the company or, as Frowen suggested, their ability to 'swear...and act the "rough" man' (Royal Commission on Safety, Evidence, 1938: Q.15,547). And while many firms declared that they chose their overmen from the 'crop' of the deputies, the

position was evidently also used as a training ground for young men who had been ordained for higher office - possibly by virtue of their familial connection with colliery directors and senior management - but who lacked the necessary underground work experience to qualify under the Mines Acts. Noting this practice, the Holland Committee reported in 1930 that the presence of such men was understandably resented by mineworkers and deputies, and concluded that 'there would appear to be something undesirable in a system which permits the appointment of persons to this important post who have neither lengthy practical experience nor have given proof of their technical knowledge' (Report: 70).

The MFGB campaigned for higher standards of technical competence amongst colliery officials and so that underground staff would be compelled and equipped to make safety a first consideration. The miners argued that standards of training should be raised in line with technical progress in the industry, with proper precautions taken to neutralize the additional risks introduced with machine mining. But mechanization was a slow and uneven process in the interwar British coalmining industry. Systems of hand coal-getting and partially mechanized mining coexisted in the industry, and even within the same mine. As a consequence, mineowners were unable to make concessions to the mineworkers. While the miners were pressing for improved health and safety provision, the mineowners could only agree to legislation that would accommodate the very different production processes they controlled. In other words, the owners wanted minimal regulation in order to retain maximum individual discretion.

Mechanization introduced new safety hazards and expanded the need for close supervision at the face. Under the 1911 Act, deputies were defined as safety officers and hence were not legally available to undertake the work

of labour coercion. Reviewing developments in the interwar period, the Royal Commission on Safety suggested that firms introducing coalface machinery had attempted to circumvent the legislation by appointing overmen, who had no statutory safety duties, to take charge of production. The available statistical evidence, however, is too incomplete to identify any increase in the number of colliery overmen employed in the industry, or at mechanized pits. And, since the extension of machine mining coincided with deteriorating trade conditions and the worsening economic performance of the British coal industry, it is likely that many firms attempted to meet the increased need for supervision at the face without increasing overhead costs, or by augmenting the workload and responsibilities of their existing supervisory staff.

Newey's description of arrangements at pits in his charge nevertheless suggests that at least some companies were prepared to increase the numbers of supervisors employed - deputies and overmen - as well as the volume of supervision experienced by faceworkers.

> On faces of 100 yards or over we have a deputy and a shot-firer on each getting shift and a deputy on the afternoon or repair shift, whilst each of the two main districts has an overman on all three shifts. We consider it most important to have a capable overman on the afternoon shift, for it is on that shift only that any lost ground can be made up..... With machine mining it is of the utmost importance to get an early start, and also to keep the conveyors running up to time at the end of the shift, and with this object in view arrangements were made for all deputies to change over at the deputies' station in their district. (1929-30: 384)

But evidently such arrangements were not universal. Newey emphasised that 'continuous supervision' was vital for 'successful machine mining', and

argued that 'supervision must be such that strict discipline is always observed'. But he suggested that this fact had not always been appreciated by firms introducing machine mining, while the Commissioners in 1938 felt it necessary in to devote a sub-section of their Report to the importance of 'continuous supervision' - in the interests of output and of safety. Some companies, therefore, may have concentrated supervision on the filling shift, leaving machine operators and the repair shift unattended for much of the time.

Whatever the particular arrangements, the potential for conflict between deputies, with safety responsibilities, and overmen was enhanced with the introduction of mechanized longwall mining, as was management's ability to monitor the performance of subordinate officials. Under the unit system, or mechanized longwall method, the working face was divided into a series of units of standard length. From each face-unit, management expected a definite amount of coal to be drawn daily. The work was more standardized, and supervisory officials were under pressure to ensure that the standard daily output was obtained from their particular district. The Royal Commission on Safety noted in their Report that, 'it is almost inevitable...that the production official should tend at times to regard the precautions of the deputy as a drag on the rate of output, and that this attitude of the production official, whether expressed or implied, should have a disturbing influence on the way the deputy does his work' (p.183). And Frowen (7), on behalf of the lower class of officials, drew attention to the 'harassing conditions under which the deputies work in nearly all coalfields', and to the fact that 'In some pits the overmen harass the deputy very much' (Evidence, 1938: QQ. 15,512, 15,547).

Man Management in the Mines

Machine mining heightened the friction between deputies and overmen, and enlarged the scope for supervisor-worker conflict at the face (Goldthorpe, 1959; Wellisz, 1953). It involved a regular cycle of discrete, but interdependent operations, organized over three separate shifts. A definite amount of work had to be completed on each shift if the continuity of production was to be maintained, and the standard daily output obtained from each unit of working face. Overmen and deputies were charged with the responsibility for ensuring a successful outcome, and were therefore compelled to impose a fresh work discipline on the men in their charge. They had to restrict the collier's autonomy, exact him to work hard at a detailed task and bring his behaviour to correspond with the dictates of a large-scale and rigidly-sequenced work system, while the expanded scope for supervisor-worker conflict introduced with this system was in turn a potential threat to the continuity of production.

Throughout the interwar years, mining engineers stressed that effective organization and supervision were the key ingredients for successful machine mining; that the work had to be 'carefully systematised' and employee behaviour brought to correspond. But they were generally reluctant to offer any further advice on labour management, or on the means whereby the worker could be brought to respond as a 'cog in a machine', a 'link in a chain of producers'. There were some exceptions, and some 'experts' who urged that the expense of close and constant supervision might be offset if workers were positively-motivated to work hard. Mavor, for example, writing in the early 1920s, favoured the introduction of new, management-designed pay incentive schemes, on the principle that the rational, economistic

worker would trade in increased effort for the potential of higher earnings, regardless of the monotony of the work, or of the rate-cutting bias of premium bonus systems (1924: 1510-11).

From the late 1920s, other commentators began to stress the importance of the 'human element' - and its general neglect by management in the coal industry. Management control, they suggested, could not be sustained simply on the basis of force or coercion. Firms had to nurture labour's cooperation and to do so, they argued, demanded some understanding of the psychology of the worker. The 'era of force', as one writer put it, had to give way to one in which managerial power was sustained through accumulated knowledge - of work and the worker - and in which the 'sympathetic handling of labour' was acknowledged to be 'one of the most essential contributions that can be made to the well-being of industry' (Wightman, 1933: 482). From this perspective, supervisory staff were seen to occupy an important position. Forming the chief connecting link between management and workers, supervisors were identified as both instruments for securing uniform and predictable employee behaviour, and as potential obstacles to this end.

Newey, for example, argued that for the 'successful accomplishment of machine mining operations' strict discipline had always to be observed. The individual workman had to become an 'expert' at his own particular task, had to be 'keen and willing to obey orders' and 'see that his work is well done and to time'. But since management demanded that the men observe strict discipline, they should discipline themselves and their under-officials and deal with the men on a fair - or at least consistent - basis. Officials had to maintain discipline, but they had to do so by applying centrally-determined managerial rules consistently, since discipline meted-out in an arbitrary or uncongenial way could only provoke grievances and

dampen enthusiasm. Officials had to be prepared to explain the reasons for their instructions, and deal with any grievances from 'one man, or the men as a whole,...immediately and sympathetically', provided, of course, that workers gave 'management the opportunity of doing so instead of pursuing the old method of at once downing tools' (1929-30: 384-5).

A more elaborate exposition on rationalized, 'scientific' management was given by Wightman, in a paper entitled 'The Psychology of Management' and delivered to the South Staffordshire Branch of the National Association of Colliery Managers in 1933. Wightman had evidently been exposed to the ideas of C.S.Myers and the (early) work of the National Institute of Psychology, and he cast supervisors in a dual role. They had to gather information on the physiology of the worker, and on the most efficient methods of performing discrete tasks, for subsequent use in job design, and be the impartial executors of managerial rules and instructions in the workplace. Faulty and overbearing supervision were identified as sources of distress for workers, and hence as impediments to efficiency and high labour productivity. Employers were advised that appropriate worker behaviour could be moulded through a system of rewards and penalties, but that these carrots and sticks had to be applied impartially by supervisory staff. The supervisor, Wightman argued, had to be a 'good disciplinarian' which meant governing with 'fairness, firmness, without fear or favour'. He had to act 'more the counsel and advocate...than the unsympathetic judge of the worker', and above all had to 'avoid the tendency to have favourites' since this was a source of irritation to workers and could only be counterproductive to high morale and high effort in production.

Wightman's prescriptions were informed by the view of the individual worker as an organism propelled by a range of, sometimes contradictory

impulses, and whose behaviour could be tailored to the needs of modern industry provided that management provided the right conditions and appropriate forms of supervision. Management-worker conflict - expressed overtly or in the form of sub-optimal productivity - were thus identified as primarily the result of poor management and uncongenial supervision. Notwithstanding the problems with this analysis, the gap between its prognoses and actual management practice in the coal industry was evidently wide. Thus, while Wightman's somewhat stunned audience professed that they could see much sense in his ideas, they also agreed that labour management in the coal industry was, in general, a rough and ready affair. There were, one discussant argued, some 'good officials who know how to get the best out of the workman', but others who 'owing to ignorance and other causes, believed entirely in bullying tactics as an aid to efficiency' (p.492).

A similar view is suggested in the literature of the interwar period and written from the 'worker's point of view', although admittedly some of the contributors had been schooled in an approach not dissimilar from Wightman's. Mitchell (1933), for example, argued that while the 'tactful handling' of men was essential for the success of machine mining, it was notable for its absence in the coal industry, where management by force - or at least by crude and out-dated methods - was the general rule. But while Mitchell had formerly been a mineworker, he had followed his own career path and by the 1930s had been appointed as an investigator at the NIIP. He believed that mechanization conferred benefits on mineowners and mineworkers, but that the latter had so far been unable to appreciate this because of the uncongenial supervision to which they had been subjected. The industry's officials, according to Mitchell, were narrowly-trained technical specialists, ill-equipped to appreciate the human difficulties

arising with technical innovation. Such problems, and conflictual supervisor-worker relationships, were therefore largely transient and could be rectified through the appointment officials and supervisory staff trained in industrial psychology and labour management.

Such a view attained a certain popularity amongst colliery managers and mining engineers from the end of the 1930s (see Parry, 1937-8; Nicholls, 1944-5), as unemployment fell with rearmament, workplace trade unionism gained strenth, and the coal industry experienced increasing difficulties in recruiting both workers and supervisory staff. And, following the nationalization of the industry, the new Coal Board displayed more than a passing interest in what by this time had become the more sociological approach of the NIIP and 'human relations in industry' school (see Goldthorpe, 1961). But the industrial psychologists of the interwar period were concerned with problems of labour motivation and compliance, and while their prescriptions may have struck a chord with some managements, for many employers in the coal industry - as in British industry more generally - the material and political context of the 1920s and 30s rendered them to a large extent redundant.

Mechanization in the coal industry in the interwar period was a slow and uneven process. Even on the eve of the Second World War, hand-holing accounted for 40 per cent of the British industry's output, and nearly 50 per cent of the mines in competition in the industry were unmechanized (see chapter 5). The number of mines in operation in the industry fell by about 30 per cent over the interwar years; from 2,600 in 1913 to 1,900 in 1938 (Supple, 1987:361). But this left the industry with an exceptionally large number of productive units, so that little had been achieved in terms of the concentration of output on large-scale, more productive mines. With

only piecemeal changes to its organizational and technical structure, the British industry became increasingly uncompetitive in international markets, and this combined with adverse conditions in both export and domestic UK markets to create mass unemployment in the coalfields. Labour market conditions buttressed managerial authority in the workplace, and no doubt enabled some firms to secure the reorganization of work and intensification of labour without the trouble or expense of employing more supervisory staff, developing and deploying new procedures or securing union agreement over their introduction. But labour market conditions, the reduction in real wages and extension of working hours after 1926 also provided the conditions in which small-scale and unmechanized mines could survive the forces of competition.

'In recent years', one union official recorded in 1936, 'there has been an immense speeding-up of the work underground, and nowadays the working day is just one big effort to get as much coal as possible out' (Jones: 20). This intensification of effort, he argued was secured through pressure from the underground supervisory staff who 'have to carry out the owners' policy of maximum output at minimum cost', and also by low wage rates in the coalfields which compelled men to 'exert themselves to the limits of their capacity in an effort to obtain a better wage at the end of the week'. These comments referred to conditions in both mechanized and unmechanized pits, and conditions were propitious for employers to attack job controls and the collier's autonomy without the use of machinery or any increased division of labour at the face. Thus, Pick (1946) referred to the way in which deputies were compelled to behave 'very strictly' in the interwar years, and furnished examples from unmechanized pits, while Frowen argued before the Royal Commission on Safety that, 'even in the hand-got

areas to-day there is a speeding-up' (Evidence, 1938: Q.15,482). For all of this, however, output in the British industry fell and the rate of growth of productivity compared most unfavourably with that attained in rival European and North American coal industries.

In unmechanized mines, low wage rates compelled colliers to intensify their work and take risks, while in mechanized mines deputies were forced to rush through their safety duties in order to attend to production. Hence, while the industry's safety record had shown some (modest) improvement over the late nineteenth century, the rate of fatal accidents and injuries actually increased over the interwar period of this century (Royal Commission on Safety, Report: 65). Yet even these dismal statistics do not bring out the actual cost for the miners' health and welfare, since premature deaths, disease, failing eyesight and hearing, have to be considered in addition to the rate of fatal accidents at work. The MFGB continued to campaign for tighter regulations on the conduct of the industry, but while this combined with pressure from other interests for an improvement in the technical standards of mine management - in line with (uneven) technical progress in the industry - the 1911 Act remained in force, unamended throughout the entire interwar period.

Mine Safety Legislation

The Coal Mines Act of 1911 established minimum standards of training for firemen, examiners and deputies, defined these officials as safety officers and delineated certain examinations which they would legally be obliged to perform during their working shift. The Act was passed when hand coal-getting remained the predominant method of coal extraction in the British coalfields. In spite of the introduction of coalface machinery during the

interwar years, the new health and safety hazards introduced with mechanization, and the changes in the organization of work which made new demands on mine management, the 1911 Act remained in force unamended throughout the period.

The legislation was reviewed at the end of the 1920s, when the Government appointed the Holland Committee to 'inquire into the qualification and recruitment of mine officials'. Although the Committee did not deal directly with the introduction of machinery and changes in work organization, it did identify serious anomalies in the 1911 Act and serious fault with the existing fireman's certificate of qualification. The test was 'no more than a physical one, together with ability to measure the quantity of air in an air current, and to test for inflammable gas' (Holland Report: 104). Changes were recommended, and principally that candidates should be required to sit an oral and a written examination, testing their technical knowledge on subjects including the detection of gas, air measurement, principles and use of flame and electric safety lamps, dangers of coal-dust, methods of supporting roof and sides, handling of explosives, preparation and execution of shot-firing, and general procedures for inspecting the underground workings.

The Committee also addressed the anomaly in existing safety legislation, which did not define the duties of colliery overmen. It recommended that men appointed to the position of overman should either possess the (new) fireman's certificate and a greater length of practical underground experience than deputies, or a more exacting qualification - the first or second class manager's certificate. The Holland Committee also recommended that overmen should be required, like the deputies, to make a statutory report on the state of the pits at the end of their shift. They argued that

it 'seems only logical that the official who may be in virtual charge of a large area of a mine, or even the whole of the underground workings, should be required to note, and to record, occurrences which may be dangerous or which may be apprehensive of danger'.

The Holland Committee's recommendations were not implemented (8), however, and a further review of mining safety legislation was delayed until the end of the 1930s. The Royal Commission on Safety, which was appointed in 1936, repeated the criticism of the existing fireman's examination, and proposed that the Holland Committee's suggestions for a more exacting test - for deputies and overmen - should be translated into law. Addressing the changes in working methods in the interwar years, the Commission noted the additional safety hazards introduced with the use of coalface machinery, and also that work reorganization in mechanized mines had created the need for more intensive managerial supervision of faceworkers. Under the 1911 Act, deputies were not legally available to maintain supervision - in the form of coercion - and the Commissioners suggested that firms had attempted to circumvent this restriction by appointing overmen to look after production. They condemned this 'evolution in the form of dual control' - with safety and production (nominally) divided between separate grades of officials - as prejudicial to safety and also to maximum efficiency. Thus, they argued that the provisions of the 1911 Act had created serious and increasing difficulties, and were in conflict with the 'exigencies of practical mining, especially in mines where the successful application of intensive mechanization depends on the uninterrupted regularity of the cycle of operations'.

The Royal Commission proposed that the 1911 Act should be amended to allow deputies and firemen to (legally) combine production and safety

duties.

> His jurisdiction should extend to all the operations in progress in his district, and, while it must of course be an essential part of his work to see that such operations are conducted with due regard to the safety of the district and of the persons employed therein, we see no reason why his duties should be limited to safety or why it should be assumed that there is some fundamental difficulty which prevents the official who is most closely and continuously in contact with the progress of work from paying due regard to both the safety and the production aspects of the art of mining, always assuming of course that the scope of his work is so adjusted as to allow him enough time for the supervision necessary to secure safety. (Report: 184)

The Commissioners sought to justify their recommendations by arguing that the safety and output of a district could not be divorced; that, in their opinion, 'efficient management and safety go hand in hand'; and by alluding to the position of mine managers who were legally responsible for the safety of employees, but combined this responsibility with the business of commercial coal production. Nevertheless, their proposed solution to the tension between the demands of production and of safety can be interpreted as simply perpetuating the view of the latter 'not as a first call upon the industry, but as something to be set against the needs of production' (Fine et al, 1982: 26).

Thus, witnesses representing the Miners' Federation had argued before the Royal Commission that the 'purely safety' aspects of the deputy's job should be emphasized, and so that safety considerations would be upheld by 'independent' officials even if these clashed with the objectives of other

staff, appointed to supervise production. Managers were responsible for the safety of the mine under the legislation. But they were also the agents of mine owners, charged with the responsibilty for profit maximization, and under pressure from boards of directors had often been compelled to prioritize output over safety considerations. Deputies had certain statutory safety duties, but had frequently complained of their inability to perform these duties because of their position, as company employees, and because of interference from superior officials with no statutory responsibility for safety. Before the Royal Commission, Frowen argued that 'Action taken by the deputy in the interests of safety may have the effect of stopping or retarding the work of production', and hence that there had been 'instances...where deputies had been dismissed, suspended or degraded in consequence' (Report: 203). The Commissioners recommended that all underground supervisory officials - including overmen - should be held directly responsible for safety, with superior officials held responsible in the event of accidents occurring after they had overruled the decisions of a subordinate officer. But they would not concede the deputies' demand for an independent board of appeal, or any system that would diminish the ulitimate authority of management to determine priorities and hire and fire staff.

Had the recommendations of the Royal Commission been translated into legislation, the practical effect at many mechanized pits would simply have been to legalize current practices. Many deputies had been 'forced on to output', or compelled to neglect safety considerations, and the rate of fatal accidents and injuries in the industry had risen steadily. But practical effect to the Royal Commission's report and recommendations was not given until after the Second World War and the nationalization of the

coalmining industry. The provisions of the Coal Mines Act therefore remained in force as the central piece of safety legislation in the coal industry throughout the interwar period.

Table 6.2. Average Annual Death and Injury Rates, Per 100,000 Manshifts Worked, 1922-1936

	Killed	Injured
1922 - 1926	0.40	65.1
1927 - 1931	0.43	69.3
1932 - 1936	0.44	65.6

Source: Royal Commission on Safety, Report, 1938:65

CONCLUSION

This chapter has examined the role and recruitment of underground supervisory workers in the British coal industry. It has focused on the colliery deputies (also known as firemen and examiners) who were at the bottom of the managerial hierarchy. But it has also considered the position of the colliery overman, the deputy's immediate superior in the mines.

Legislation in 1887 obliged mineowners to appoint 'competent persons' for safety duties, and principally the inspection of the working parts of the mine prior to the start of coal-getting shifts. The Coal Mines Act of 1911 stipulated a minimum standard of qualification for firemen, examiners and deputies, and ostensibly confined these officials to the performance of

work connected with the implementation of safety regulations. The legislation of 1911 had been drafted when hand coal-getting remained the predominant technique of coal extraction in the British coal industry. The Act remained in force as the principal piece of legislation regulating health and safety standards in the mines throughout the interwar period, and was only substantially amended after the Second World War. Yet mechanization was gradually introduced in the interwar years, and brought new health and safety hazards for underground workers.

In this period, the operation of under-cutting the coal was mechanized and conveyors were installed to transport the coal from the face to subsidiary haulage routes. The introduction of coalface machinery and increased use of electricity in the mines added to the risks of underground explosions, and exacerbated the conditions which caused diseases such as pneumoconiosis and nystagmus - affecting the lungs and eyes respectively. Mechanization added to the already substantial health and safety hazards in the mines, while the reorganization of work that accompanied the use of coalface machinery created the need for management involvement in the coordination of the production process and control over the pace and performance of work. Under the 1911 Act, deputies were confined to safety work. But there is considerable evidence to suggest that in many mechanized pits, they were increasingly 'forced onto output'. Overmen, who had no statutory responsibility for safety, were appointed to supervise production and could over-ride the deputies' instructions.

Mechanization was a slow and uneven process in the interwar British coal industry. In 1938, only 60 per cent of aggregate output was cut mechanically, although the proportion varied across the coalfields from 90 per cent in Northumberland to 26 per cent in South Wales. The British

industry lagged behind its principal international competitors in the application of new production technologies. The results of mechanization - in terms of productivity growth - were unimpressive, and interwar commentators and official enquiries suggested that this owed in part to the failure of employers to appreciate that the new production techniques required properly trained men and officials to get the best results (eg Reid Report, 1945:5-6). But the recruitment and training of colliery officials was regulated by legislation, and while the miners pressed for more exacting standards - in the interests of health and safety at work - the mineowners were vigorously opposed to change.

The piecemeal introduction of mechanization in the interwar period reproduced and reinforced variations in the organization of work and structures of underground employment across the British coal industry. Mineowners could not agree to more stringent safety regulations because they controlled very different work processes. Small mines and unmechanized pits had been able to survive because mineowners secured wage cuts and an extension of working hours in 1926. Miners were forced to work at an exacting pace, in order to maintain their earnings, and to ignore basic safety precautions, and clearly more stringent health and safety regulations would have restricted the owners from minimizing expenditure and maximizing output at such pits. Legislation impinged on local working practices; for example, in the North East where the deputies set the timber at the face. In 1938, the Royal Commission on Safety urged that the deputy's role should be to 'instruct, direct, and supervise the manual work of others, not to do it himself' (Report: 186). But mineowners in the North East were fiercely opposed to this suggestion, since such a ruling would have forced unmechanized pits (which predominated in Durham) to alter

existing practices and employment structures. The Mining Association rejected the recommendations of the Holland Committee, which in 1930 had pressed for a higher standard of examination for overmen and deputies, and opposed many of the recommendations of the Royal Commission on Safety in 1938.

Mechanization in the interwar period was therefore introduced under the existing provisions of the 1911 Coal Mines Act. The rate of fatal accidents and injuries in the industry, which had shown a modest improvement in the years immediately before the First World War, rose over the interwar period. Work intensification and the extension of working hours caused the premature death of miners and the misery of injury, disease and exhaustion. The cost was borne immediately by the miners, but also by the mining industry which used labour ineffectively and consumed labourer's lives in the most profligate manner.

CHAPTER SEVEN: LABOUR UTILIZATION AND MANAGEMENT IN THE BRITISH COAL INDUSTRY, 1900-40

This thesis examined the utilization and management of labour in the British coalmining industry in the years between 1900 and 1940. The inquiry straddled two periods of contrasting fortunes for the coal industry. Output and employment increased rapidly over the nineteenth and very early years of the twentieth century. Expansion was facilitated by the opening-up of large export markets in Europe and, on the eve of the First World War, the British industry shipped abroad a third of its output of 287 million tons.

Dominating the international coal trade in the early twentieth century, the British industry slipped from international pre-eminence in the years after 1913. In the interwar period it was characterized by shrinking export markets, high levels of unemployment, and bitter industrial strife. In spite of intensifying international competition, the industry failed to reconstruct. There was a failure to concentrate output on large-scale, more productive mines, while the British industry also fell behind its European and North American rivals in the application of new extractive technologies. Productivity growth was relatively slow. Output per manshift rose by only 13 per cent between 1913 and 1938. This compared with increases of 56, 64, and 101 per cent in the coal industries of Poland, Germany, and the Netherlands.

Coalmining was not the only great export-oriented sector of the nineteenth century British economy to experience a loss of overseas markets and acute economic difficulties in the twentieth century. Economic historians have discussed the relative decline of Britain's staple

industries in terms of the efficiency of management decision-making - the failure or success of the nation's entrepreneurs. Entrepreneurial performance has been assessed by different criteria. Chapter two of the thesis outlined the different theoretical perspectives informing these analyses.

Neoclassical economic historians have conceptualized entrepreneurial success in terms of 'constrained optimization', or the minimization of costs subject to given technical and market constraints. Institutionalists, in contrast, crediting (some) social agencies with a creative role in the process of economic development, have defined successful entrepreneurial activity as the supersession of prevailing constraints on profitability. Developing the second approach, Elbaum and Lazonick have argued that British economic decline in the twentieth century owed much to the inability of the nation's industrialists to transform their socio-economic environment in response to the rise of corporate capitalism abroad. They contend that British managers were unsuccessful entrepreneurs because they were constrained by the economic institutions laid down in the nineteenth century heyday of British competitive capitalism - structures of industrial organization, enterprise management, and industrial relations.

Elbaum and Lazonick's empirical research centres on the British iron and steel and cotton industries. But they argue that their analysis has a broader application and provides the conceptual apparatus that can make sense of the difficulties encountered by other staple sectors - including coalmining - and of British industry more generally. There are problems with their analytical approach, however, and most particularly the treatment of institutions in isolation from the social relations impacting upon them. Elbaum and Lazonick suggest that in Britain, the institutions of

the nineteenth century became a given constraint for successive generations of industrial capitalists, while abroad managements had considerable scope to re-fashion existing arrangements. But they offer little explanation as to why this should have been so, and it is rather difficult to accept that the institutions of the nineteenth century British economy have survived intact up until the present day. Irrespective of the particular context to which it is applied, what is missing from Elbaum and Lazonick's institutional perspective is a theory of institutional change; a perspective in which institutions are seen as the product of the complex and contradictory interplay of social and economic forces.

In this thesis, the changing performance of the British coalmining industry has been analysed in the context of its changing economic and social structure. The particular focus has been the evolving pattern of industrial relations. But as chapter two emphasized, the industry's uneven development cannot be understood in terms of labour relations alone. Fine et al. have addressed the changing relationship between landowners and mineowners, the former retaining the ownership and control of coal royalties in Britain up until 1938. They have shown how this relationship was conducive to the industry's expansion in the nineteenth century, but increasingly impeded reorganization and development. Fine et al.'s work has been summarized because it indicates that the diversity in work organization and labour relations that marked the British industry was in part the product of the conflicts between landowners and mineowners, which developed unevenly within and between the different coalfields and were resolved in different ways. The structure of mine ownership, and competitive relations between colliery firms must also be considered. In this concluding chapter, some reference will be made to the interplay of

relations between landowners, mineowners, and mineworkers, and the broader economic and political context of the period.

The analysis of industrial relations began in chapter three by looking at labour utilization in the coal industry in the period before the First World War, and the links between work organization and labour organization. Coal production remained a labour-intensive process. Mechanization had largely been confined to mine construction and some surface operations. Wages formed the largest element in working costs, and profitability was highly dependent upon the relationship between wages and selling prices. Negotiations over wages had been conducted increasingly at a district or county level over the second half of the nineteenth century. Sliding scale mechanisms of wage determination were gradually displaced by conciliation boards from the 1880s, although conflict still centred on the rate at which wages should fluctuate with selling prices.

Hand coal-getting predominated in all coalfields. At the coalface, the collier or work group performed the complete operation of winning the coal, which comprised the different tasks of undercutting, ripping and filling. Colliers retained immediate control over the pace of work. Paid on a piece-rate system they were subject to limited direct managerial supervision. The experiences of other grades of underground and surface labour were often quite different, however, and across the British industry structures of work organization were remarkably diverse. Chapter three related regional diversity in work organization to the influence of geological conditions, and also the interplay of relations between workers, and between mineowners and mineworkers.

Chapter four continued the discussion by looking at different forms of subcontracting in the coal industry. The big butty system, whereby

mineowners (and sometimes landowners) sub-let the working of an entire pit, or even a group of pits, to a contractor or partnership of contractors, was employed in a number of coalfields in the early nineteenth century. But in most areas it was on the decline from the 1860s. Legislation from the 1870s obliged all but the very smallest pits to appoint resident, full-time managers who were qualified mining engineers. Clearly some companies interpreted the legislation very loosely, and appointed a qualified manager to supervise a group of pits, with individual mines left in the day-to-day charge of an overman, or onlooker. But in some areas, even larger companies with a relatively well-developed hierarchy of managerial and technical staff, continued to employ a form of subcontracting - the little butty system. Stalls, or sections of the working face, were sub-let to butty-men or contracting colliers who engaged (or selected) and paid other workers. In practice, the arrangement could vary enormously. Even within a single mine there might be work teams which shared the work and earnings equally, and others in which the ganger or butty-man controlled the distribution of the piecework earnings over and beyond the payment of minimum shift rates.

Work organization and working practices varied in the different coalfields. As chapter three argued, miners were divided in complex ways by their different experiences of work, and unity was difficult to establish. District and county trade unions had emerged as more permanent associations in many coalfields by the 1880s, and a majority of these autonomous associations came together to form the Miners' Federation of Great Britain in 1889. A loose-knit association, the MFGB could not command general support in the wages struggles of the early 1890s. Its policies were opposed by the county unions in the North East where sliding scales remained in force, and where distinctive working practices were at the

heart of the northern hewers' opposition to the MFGB's campaign for a general reduction in working hours. But organization was gradually built-up at local levels, and in spite of the opposition from the northern unions, and from the mineowners, the MFGB was eventually successful in securing the introduction of legislation limiting the working day to eight hours. The county unions of Northumberland and Durham joined the Federation in 1908, after the passage of the eight hours Bill and, as a more cohesive body, the MFGB went on to campaign for a national minimum wage.

Mineowners had combined to form a national association - the Mining Association of Great Britain - as early as the mid-nineteenth century. But this was a loose federation of district employer associations and individual mineowners, and its activities were defined and circumscribed by its constituents. Mineowners were divided by many of the factors applying to the mineworkers. Geological conditions varied between, and within, the different coalfields which were oriented towards different product markets, and systems of work organization were also varied. These conditions meant that the owners were likely to be differentially affected by uniform restrictions on labour utilization. The example of the eight hours legislation cited in chapter three illustrates the point. In the North East, existing arrangements had to be altered to comply with the legislation which came into force in 1910. The changes secured benefitted the owners, who were able to introduce an additional coal-getting shift and thus maximize the utilization of their fixed capital investments. In South Wales, in contrast, where colliers had formerly worked a single, very long shift, hours of coal-drawing were reduced and the owners pressed for compensating wage cuts.

From the early twentieth century, the miners achieved a degree of unity around the demands for better health and safety provision, a national minimum wage and a national wage structure. But because profitability was likely to be differentially affected, the owners could not agree to concede reforms. Any common employer policy had to accommodate regional variations in geological and working conditions, and hence the mineowners could organize their collective strength only in opposition to the miners' demands. The owners united to preserve maximum discretion in wage and employment regulation at local levels, and to maintain the flexibility of responding to changing economic conditions by cutting wage rates. This had a profound and negative impact on the industry's long-term development, reinforcing other factors that were operating to discourage reorganization and modernization.

The diversity in working practices and conditions that marked the industry in the period before the First World War was heightened, rather than diminished, in the interwar years because the transition from hand-getting to mechanical-cutting was very uneven within and between the different mining districts. Chapter five looked at the general features of the partially-mechanized mining system introduced in this period. Coal-cutting machines were developed for longwall applications in the British industry. With the use of machines to undercut the coal, the longwall method of extraction (advancing from the face) which had been an enormously varied arrangement, was developed into a more standardized system of working. A single working shift was set aside for the operation of cutting, and so that the machines could be used to continuously undercut a face of up to 200 yards. Other operations were organized over two further shifts.

With this system, the cycle of coal-getting operations could be completed only once in every period of 24 hours.

Workers were grouped into large work teams, but the work was sub-divided and arranged over three shifts. Within each shift, there was a more intensive division of labour. Colliers formerly responsible for all the operations connected with coal-getting were confined to the performance of a narrowly-defined task. They were effectively de-skilled and lost their immediate control over the pace of work. The new division of labour made greater demands on the management organization. Pit officials had to be deployed to coordinate the production process, and to coerce and pace workers performing discrete but interdependent tasks.

The transition from hand coal-getting to mechanical-cutting was slow in the British industry and took place very unevenly. At the level of individual mining districts, and of pits within them, geological and market conditions, conflicts between mine and landowners, and between employers and workers, combined in different ways to promote or inhibit change. Chapter five explored the particular circumstances of a number of coalfields, but emphasized that there were intra-regional variations in the pace of mechanization. It stressed that factors inhibiting investment in any particular area had wider implications, dampening the force of competition across the industry. And because piecemeal mechanization combined with deteriorating market conditions to increase unemployment, there was a downward pressure on wage rates which in turn supported the survival of unmechanized mines. This combination of conditions is perhaps illustrated by the example of the small Kent coalfield where production came on stream in the 1920s, but where hand-hewing and the little butty system survived into the late 1930s.

Throughout the interwar period, systems of hand-getting and partially-mechanized mining coexisted in the industry. Chapter six argued that it was in large part because of the industry's unevenness that the mineowners were unable to agree to any reform of the law on industrial safety. The use of machinery and of electricity in the mines introduced new safety hazards and increased the production of coal-dust. More stringent controls on working conditions were required to protect the miners from injury and dust-related diseases. Yet the Mines Act of 1911, which had been framed in the era of hand-getting, remained in force throughout the interwar period as the principal piece of legislation regulating health and safety standards.

The 1911 Act stipulated the qualifications necessary for various grades of production officials. It ostensibly confined colliery deputies, at the bottom of the managerial hierarchy, to the performance of work connected with the implementation of safety regulations. But it left various loopholes, to accommodate regional variations in working practice - as, for example, in the North East where deputies set the timber at the coalface - and in the interwar years, firms made full use of these exemption clauses. The use of machinery and new division of labour at the face in mechanized pits created new demands on the management organization. It created the need for greater coordination of the production process, and greater coercion of workers. And while machinery also heightened health and safety risks, deputies were often obliged to act as production rather than safety officials, or to submit to the instructions of overmen appointed by senior levels of management for the purposes of ensuring the continuity of production. Overmen did not have a statutory responsibility for safety and, as the deputy's immediate superior, could over-rule the latter's instructions.

In the interwar period, the rate of fatal accidents in coalmining actually increased - having shown some improvement in the years immediately before 1913. Safety legislation failed to advance with technical innovation in the industry. But mechanization was an uneven process and in the interwar years working conditions deteriorated in unmechanized pits. Wages were depressed and, in an effort to maintain their earnings, pieceworkers were forced to intensify their work and take risks at the expense of their health and safety.

Deputies were pressured by senior levels of management to prioritize production over safety. Through their associations, they campaigned to be made state employees and, failing this, for an independent appeals board to investigate cases of unfair dismissal. The deputies were supported in these demands by the Miners' Federation, but were unable to secure any improved employment protection. From its inception, the MFGB had prioritized the demand for improved health and safety provision. But mineowners were unwilling to concede reforms because they controlled very different work processes, and in the interwar period the miners were unsuccessful in their struggles for improved conditions.

The Miners' Federation had to struggle to overcome divisions within its membership but, from the early twentieth century, achieved a growing unity around the demands for better safety provision, reduced working hours, and national wage bargaining. The mineowners were unable to agree to broad concessions. The implications of the miners' struggles over economic matters began to extend into more advanced political issues. As early as 1894, a resolution had been introduced at the MFGB's annual conference in favour of state ownership of the mines. But the proposal was not for workers' control, or even joint control with the state and in any event

could command limited support. The miners were divided at both the political and economic levels. Even in the years immediately before the First World War, the influence of the Liberal Party was still strong in some mining districts, and the MFGB was in fact the last of the major unions to affiliate to the Labour Party - in 1909 (see Gregory, 1968). But nationalization moved further to the centre of the miners' agenda, and the struggles and successes of the years during the First World War were of crucial importance in this respect.

Government controls imposed in 1917 included profit-pooling arrangements and allowed for cross-subsidy payments to be made between different mining districts. This meant that flat-rate wage increases could be conceded on a national basis without imposing an intolerable burden on profitability for particular sections of the industry. The miners pressed for the extension of government controls and, in 1919, presented the explicit demand for the nationalization of the industry. By this time the miners were united in the demand for nationalization because this was generally seen as the precondition for better working conditions and a better standard of living. For some miners, albeit a minority, it also represented a first step towards the overthrow of capitalism. Unremarkably, the mineowners were opposed to nationalization. They strengthened their own national association in this period, conceding additional powers to the MAGB which became a more centralized and bureaucratic body. The owners strengthened their national organization in order to ward-off nationalization, and secure an early termination of wartime government controls. Because of their need for maximum individual discretion, they pressed for a return to the structures of wage and employment regulation of the past.

The aftermath of the First World War was a period of political and economic instability in Britain and internationally. In Britain, the Labour Party had emerged as a major electoral force and the Liberal Party was on the decline. But the Labour Party was still unable to command sufficient support in Parliament to maintain a government. Its coalition with the Liberals quickly collapsed in 1924. The British trade union movement had emerged from the war years in a much strengthened position, and sections of it were militant and combative. Nevertheless, the labour movement was hardly a unified force, and in terms of their organization, cohesiveness, militancy, and political consciousness, the miners represented a relatively advanced section. The miners needed solidarity action to pursue their demands and influence government economic policy. While they were able to unite other groups of industrial workers around their struggles from time to time, support was by no means guaranteed. Rather it was conditional upon the economic situation, cohesiveness and consciousness of other groups of workers (see, for example, Wrigley, 1987; Skelley, ed., 1976).

There were divisions within the capitalist class; between sections pressing for active government intervention to promote the restructuring of private industry, and sections which were firmly anti-interventionist, viewing government involvement as a prelude to public ownership. The mineowners fell into the latter group. Because of the conditions under which production was organized in coalmining and the constraints inhibiting amalgamation and mechanization, the mineowners could not agree upon or concede to schemes for the reorganization of the industry proposed by the Liberal and Labour parties in the early-to-mid 1920s. And although the mineowners initially supported proposals for the nationalization of mineral royalties, they reversed their position after 1919 as this was seen as a

hostage to fortune in the political climate of the times. The landowners were of course behind the mineowners' anti-interventionist stance. The interests of British finance capital also fell behind this line. The 'City' was striving to restore its international role, and with its interests in short-run capital movements it had to limit its commitment to long-term finance for British industry. And because 'the City' also made its money from government borrowing, it could not support government involement in the reorganization of British industry (see Fine et al. 1985). In retrospect, it can be seen that sections of British capital in favour of government intervention achieved their prominence in the early-to-mid 1920s when labour militancy was at a height, and when short-term economic and ideological concessions had to be made to contain the miners.

At the end of the First World War, the miners were pressing for nationalization and the mineowners for a return to the conditions of the past. Governments in the period between 1919 and 1926 intervened tactically, to appease the miners when this was expedient, but within an overall commitment to private ownership. In 1919, when there was a threat of a coal strike, and possibility of supportive active from the miners' partners in the Triple Industrial Alliance - forged with the rail and transport workers in 1913 - the government appointed the Sankey Commission to investigate the miners' demands. A majority on the Commission proposed that the mineral royalties and mines should be taken into public ownership. The miners secured a wage increase, and a seven hour day, but the government was able to reject nationalization and bury the Sankey Report as the threat of industrial action passed.

In March, 1921, five months earlier than planned, the government returned control of the coal industry to the mineowners. The immediate context was a

slump in the export trade, and there was rising unemployment elsewhere in the economy where the post-war boom had been eclipsed somewhat earlier. Pressing for wage cuts and a return to district wage settlements, the mineowners precipitated a three month stoppage of work in the coal industry. Support from the miners' partners in the Triple Alliance collapsed, with the aid of the government's activities, and the dispute ended in the owners' favour. Between 1922 and 1924, the temporary dislocation of coal production abroad artificially boosted the fortunes of British coal exporters, and the miners secured a revision of the minimum wage provisions in the terms of settlement of the 1921 agreement. But in 1925, the mineowners pressed for wage cuts, the abolition of the minimum wage provisions of the settlements of 1921 and 1924, and an extension of working hours. Under the threat of economy-wide industrial action ('Red Friday', 31 July, 1925), the government intervened to offer a nine month subsidy which was to last while a Royal Commission investigated the dispute in the coal industry.

The Commission, chaired by the Liberal politician Sir Herbert Samuel, made sweeping criticisms of the coal industry. It recommended a radical reorganization of the industry's structure, arguing that this was the only way in which the industry's international competitiveness would be secured in the long-term. And, although it rejected nationalization, the Samuel Commission recommended that legislative powers should be used to promote amalgamations if reorganization was not pursued voluntarily. On the other hand, it conceded a case for short-term wage cuts - although urging that the national framework governing district wage settlements should be retained (to limit inter-district wage-cutting) and dismissed the owners' demand for a return to an eight hour working day as irrelevant to the

predicament of British coalmining. Neither the miners nor the mineowners could accept the Samuel Report. Insisting upon wage cuts and an extension of working hours, the mineowners precipitated the General Strike of 1926, the details of which are well-known.

Forced to surrender to the owners' terms in November, the miners were defeated and their unity broken. The defeat of the miners was necessarily a set-back for the wider labour movement, and trade union membership fell. If British workers and their trade unions had simply constituted a constraint on entrepreneurial initiative, inhibiting reorganization and re-equipment through the exercise of job controls as is suggested in, for example, Elbaum and Lazonick's analysis, then some acceleration in the diffusion of new production techniques might have been expected to follow the events of 1926. But certainly in coalmining this was not the case. The proportion of industry output undercut mechanically doubled between 1927 and 1938. But as chapter five of the thesis noted, this increase owed largely to the more intensive application of machinery within mechanized mines, and there was no widespread conversion of hand-getting pits to mechanical cutting. Large numbers of unmechanized pits remained in competition at the end of the interwar period, accounting for 40 per cent of British coal output, while hand-hewing had virtually disappeared in Continental coal industries. In the British industry, the number of mines in operation fell by approximately 30 per cent between 1913 and 1938, and the bulk of this reduction occurred after 1926. But little was achieved in terms of the concentration of production on large-scale, modern mines. Indeed, in those districts where concentration was most noticeable - Nottinghamshire and South Yorkshire - the most active period of structural change had been

before 1926, and over the industry as a whole the rate of new pit development slowed to a trickle in the late 1920s and 1930s.

The defeat of the miners in 1926 ensured the defeat of those forces acting to restructure the coal industry. Had the General Strike resulted in a labour victory, the result would have been to force drastic government intervention. Nationalization of the mines would have become the next issue. But the defeat of the miners also meant the triumph of the anti-interventionist wing of British capital (see Fine et al. 1985). With wage cuts and the extension of working hours, the mineowners were able to maintain profitability, while the coal industry staggered on without the major reorganization that was required to restore its competitive position internationally.

Kirby (1973) offers a different interpretation, and one that has been examined critically in chapter two of this thesis. He argues that it was government intervention in the 1930s that impeded the reorganization of the coal industry because the different aims of government policy were contradictory. Part one of the 1930 Coal Mines Act gave statutory support to sales cartels organized on a district basis, while Part two built upon the Samuel Commission's recommendations and established the Coal Mines Reorganization Commission to promote amalgamations in the industry. But Kirby's argument that cartellization necessarily defeats the forces for reorganization is contradicted by the example of the German coal industry, and his own detailed account provides evidence that Part two of the Coal Mines Act had more or less failed before it was placed on the Statute Book. The mineowners secured the imposition of such stringent conditions for the confirmation of compulsory amalgamation schemes that the CMRC had virtually no statutory powers (Kirby, 1977:131). The mineowners supported Part One of

the Act, which gave statutory support to the voluntary cartel schemes they had organized in the aftermath of the General Strike. And under these schemes the mineowners 'got a new lease of life' (Heinemann, 1944:118) because the profitability of existing capacity was maintained in conditions constraining reorganization to reduce unit costs.

Mineowners used their collective power to secure statutory backing for the voluntary marketing schemes organized in different districts over the late 1920s, while individual firms sought their own solutions within the particular constraints in which they operated. Over the 1920s and 1930s, there were successive waves of merger activity. Large firms became relatively more important. Amongst the largest were firms that did invest in the reorganization of production, and reorganized their internal management structures along the lines of the modern capitalist corporation. Others were more akin to holding companies which acquired large numbers of relatively small scale pits, and were able to maintain prices without reorganizing capacity where they controlled the supply of a particular type of coal (as, for example, in the case of Amalagamated Anthracite). There was also a considerable degree of diversification, into coal preparation and coal-consuming industries. Vertical integration allowed mining companies to appropriate profits from coalmining through their subsidiaries - thereby avoiding the claims of the landowners, and the mineworkers whose wages, under the district agreements from 1921 onwards, were related to the profits on the sale of coal at the pithead. But low wages in the industry and sales cartels also fostered the survival of large numbers of smaller - and some very tiny - companies, and this was of little advantage to the larger corporations. There were renewed pressures for change and in 1938 the coal royalties were nationalized - by a Conservative government.

The nationalization of the mines followed, although not immediately. Coal production was vital to the war economy. But there were output shortages and increasing recruitment difficulties (with miners opting to enlist in the army, rather than remaining in the industry). In spite of resistance from the mineowners, who anticipated that greater regulation would lead to public ownership, the government imposed certain wartime controls on the coal industry. The Labour Party was committed to nationalization and, in anticipation, the MFGB reorganized itself into the National Union of Mineworkers (although in practice the union continued to operate very much on a federal basis). In these circumstances, the mineowners were reluctant to invest and coal output was drained from the industry's existing capacity. The Reid Committee, appointed by the government in 1944, more or less declared the coal industry bankrupt. The Committee recommended a major programme of reorganization and re-equipment - the concentration of output on large-scale pits, with improved layouts and underground haulage systems - and that an effective national 'authority' would be required to ensure that reorganization. The mineowners protested, offering their own scheme for a single cartel, but with the Labour Party's electoral triumph in 1945, nationalization became certain.

The reconstruction of the coal industry achieved under public ownership is beyond the scope of the present study, although many of the themes and preoccupations of the thesis continue to be relevant. Nationalization overcame the problem of fragmented ownership, and facilitated many of the reforms that had previously been frustrated, including improvements in the areas of safety and welfare. Nevertheless, conflict over the control of work, nature of supervision, payment systems, wages and working conditions, did not disappear with the change of ownership. Under public ownership, the

coal industry's expansion has been circumscribed by government policy, while the miners ability to influence the industry's development has still been contingent upon their ability to unite and to unite other sections of the labour movement around their struggles.

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NOTES

Chapter Four: Contract Work and the Butty-System

1. For contrasting accounts see Humphries, 1981, and Barrett and McIntosh (1980).

Chapter Five: Mechanization in the Interwar British Coal Industry

1. The figures for percussive machines in use in 1938 include 'other types', such as pneumatic picks. These were similar to percussive machines, in that they might be hand-held and operated by the collier to break into the coal before filling it. But those in use in the interwar years were more powerful than the earlier percussive type employed in the British industry and had been introduced from the Continent where they were quite widely employed in the Ruhr and Dutch coalfields. In Britain, the US, and Poland, however, pneumatic picks were employed only on a limited scale in the interwar years. See Reid Report, 1945:47.

Chapter Six: Colliery Deputies and Overmen

1. In some districts, shot-firers were in fact the lowest rank in the hierarchy of production officials.

2. Melling (1980) and Spencer (1975) make this point forcefully. Exceptionally, Goldthorpe (1959, 1961) has studied supervisory-worker relations in the British coalmining industry.

3. In the years immediately after the First World War, even the colliery managers were becoming more assertive. The National Association of Colliery Managers (NACM), formed in 1887, largely reiterated the Mining Association's position on matters relating to industrial safety, the training and recruitment of colliery officials. Carr-Saunders and Wilson (1964) argued that NACM kept a low profile, confining its deliberations to technical issues, because the mineowners would not tolerate their agents voicing a (collective) opinion on matters with 'political' overtones - such as the industry's structure and performance, and its industrial relations. Also relevant, however, is the fact that NACM - or its constituent district mine managers' associations - embraced within their membership men who were company directors. In 1919, NACM and the various district associations were

certainly vociferous opponents of nationalization. But these associations were also expressing their members' discontent as regards salaries, hours and conditions. The Scottish Mine Managers' Association rejected the owners' pay offer in May, 1919; the Northern Colliery Officials' Association advised the mineowners that managers were 'not satisfied with their position' and wanted a 'good salary, reasonable hours, and a share in profits'; and the retiring president of NACM stated that 'colliery managers would have to move with the times, and take up more aggressive action in their own defence, or otherwise...be left behind' (*Colliery Guardian*, 9.5.1919: 1099; 6.6.1919: 1359).

4. Although, having succeeded in negotiating a county agreement in 1918, the then General Secretary of the National Association apparently 'assisted with the negotiating of a private scheme on behalf of the Staveley Collieries Deputies in 1920' - an action which England declared was 'most difficult to understand' (1963:26).

5. Although the TUC's Disputes Committee at this time was dealing with the issue in Scotland where both the miners' union and firemen's association were attempting to recruit supervisory grades.

6. 'The modern tendency.... seems to be to pay less regard to securing the maximum concentration of men and output on the longest workable faces, and more regard to planning the most economic length of face in relation to the amount of roadway making and maintenance required' (Reid Report: 42).

7. Frowen's evidence before the Sankey Commission in 1919, and again before the Royal Commission on Safety in 1938, suggested that across the coalfields the interests of overmen and deputies were deeply divided. In a few districts, however, the two groups were organized within the same association in the interwar years. In 1946, on the eve of the nationalization of the coal industry, the National Federation of Firemen, Examiners and Deputies was reconstituted as the National Association of Colliery Overmen, Deputies and Shot-firers.

8. Certain of the Holland Committee's recommendations were given effect in the 1930s. But these related to the qualifications for the position of mine manager and under-manager, rather than to the training and duties of overmen and deputies.