

BOARD OF TRADE

INDUSTRIAL SURVEY
OF THE
LANCASHIRE AREA

(EXCLUDING MERSEYSIDE)

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The Victoria
University of Manchester.
Department of Commerce.
February 17th, 1932.

*To the Rt. Hon. Walter Runciman, M.P.,
President of the Board of Trade.*

SIR,

By a letter from the Board of Trade dated the 25th March, 1931, the University of Manchester was invited to conduct an industrial survey of the Lancashire area. At the same time, it was intimated that our enquiries should be directed towards the production of a report which should include :—

- (a) a survey of the present industrial position of the area;
- (b) the prospects of early expansion and new development, having regard particularly to new industrial developments within recent years, and
- (c) so far as practicable, an assessment of the prospective employment capacity of the various industries in the area as a basis for an estimate of the volume of labour likely to be surplus to the requirements of individual industries within the next few years.

We have now the honour to submit the accompanying report on the above matters.

We have the honour to be,

Sir,

Your obedient Servants,

G. W. DANIELS.
JOHN JEWKES.

MAP OF THE SURVEY REGION.

PARTS OF COUNTIES OF LANCASTER, CHESTER
AND DERBY IN THE MANCHESTER UNIVERSITY
SURVEY REGION. (SHOWING COUNTY BOROUGHS AND
MUNICIPAL BOROUGHS)

BOUNDARY OF THE SURVEY REGION. - - - - -
COUNTY BOUNDARIES. - - - - -
COASTLINE. ————
COUNTY BOROUGHS. BLACKBURN.

Scale of miles. 0 2 4 6 8 10 12

NOTE: Morecambe and Heysham, and
Lytham St Anne's, now constitute
single Municipal Boroughs



MAP OF THE SUB-AREAS IN THE SURVEY REGION.

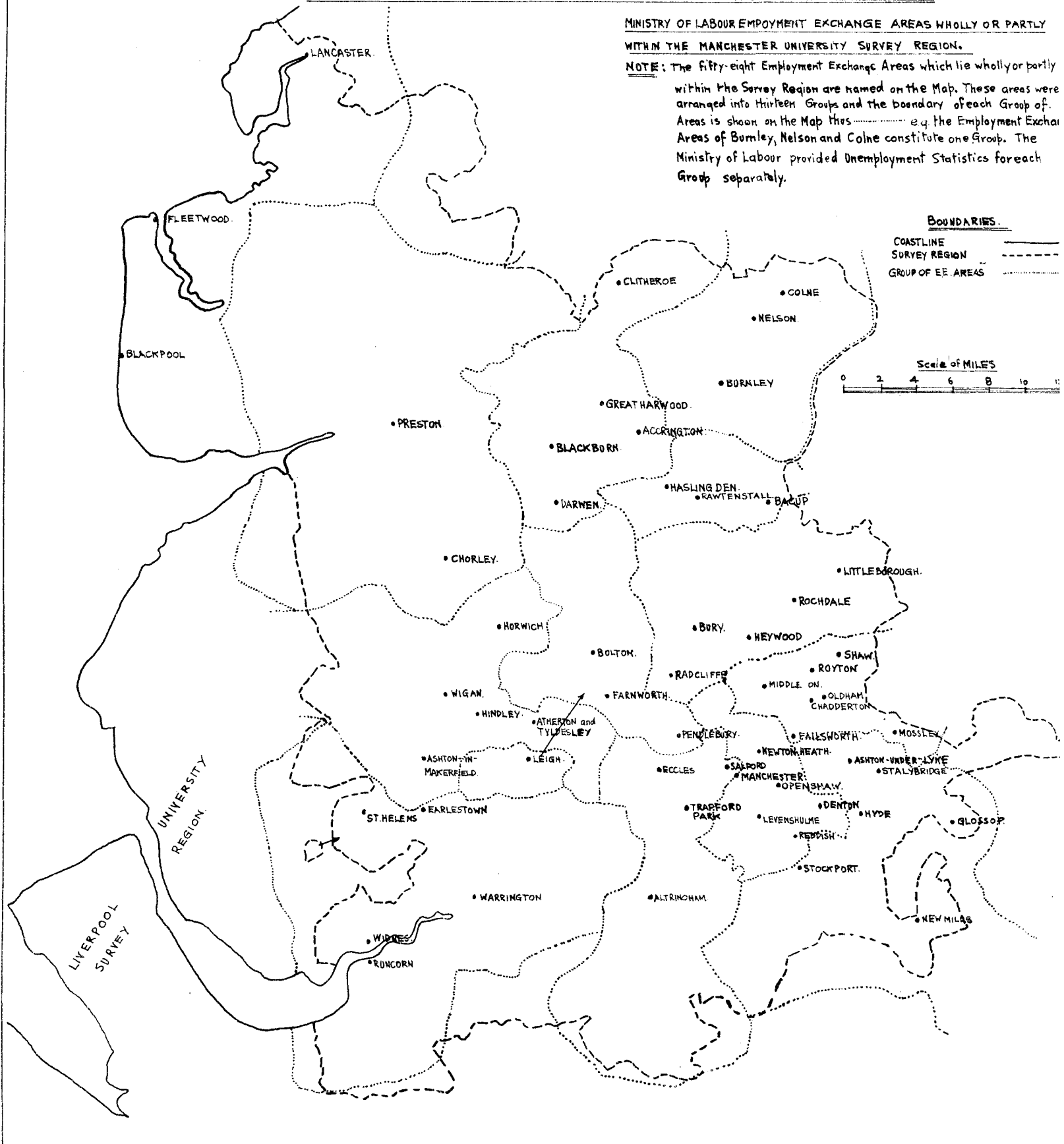
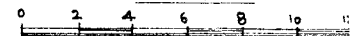
MINISTRY OF LABOUR EMPLOYMENT EXCHANGE AREAS WHOLLY OR PARTLY
WITHIN THE MANCHESTER UNIVERSITY SURVEY REGION.

NOTE: The fifty-eight Employment Exchange Areas which lie wholly or partly within the Survey Region are named on the Map. These areas were arranged into thirteen Groups and the boundary of each Group of Areas is shown on the Map thus e.g. the Employment Exchange Areas of Burnley, Nelson and Colne constitute one Group. The Ministry of Labour provided Unemployment Statistics for each Group separately.

BOUNDARIES.

COASTLINE —————
SURVEY REGION - - - - -
GROUP OF EE AREAS

Scale of MILES



PREFACE.

This report is the outcome of the collaboration of a number of investigators connected with the Departments of Economics, Commerce, and Administration in the University of Manchester. Mr. T. S. Ashton was responsible for the study of the trends of population between 1851 and 1921. Mr. E. M. Gray carried through a very detailed investigation, of which only a summary could be given in this Report, of recent technical changes in the cotton industry and their relation to the demand for labour. Miss F. Collier and Mr. S. G. Roberts undertook the difficult task of recording the changes in structure and trends of employment in the clothing industry, a task which involved a great deal of interviewing and first hand enquiry into the position of several trades of which little was known. The chapter on Agriculture in Lancashire and Cheshire was the work of Mr. J. Orr; that on Local Rates and Industry the work of Mr. D. N. Chester; and the study of the coalmining industry the result of investigations by Mr. W. Prest. Mr. A. L. Dakyns was largely responsible for the chapter dealing with employment among Local Authorities. The chapter on the metal and engineering trades arose out of enquiries undertaken by Mr. J. B. Andrew. The making of several maps, essential for the Survey, was carried out by the Geography Department under Professor H. J. Fleure.

The organisation and co-ordination of the Survey, and the preparation of the remaining chapters, were in the hands of the Research Section of the above Departments of which Mr. J. Jewkes is Supervisor and Mr. A. Winterbottom Principal Assistant.

It would be impossible to name individually the many organisations and firms which have willingly given help and information to these workers. The greatest obligation must be to the Ministry of Labour, through its officers both at Headquarters and the North-Western Divisional Office, which has provided the great mass of statistics upon which the Report is based. It is impossible to speak too highly of the willing advice and help received from this source. Other Government Departments have provided much statistical information—notably the Board of Trade, the Home Office, the Ministry of Health, the Ministry of Transport, the Department of Mines, the Department of Agriculture, and the Electricity Commission. Local officials connected with Employment Exchanges, Trade Boards, and Factory Inspection, have also shown themselves most ready to help.

The Local Authorities in the Survey Region have gone to great pains to provide complete information in connection with a number of questionnaires despatched to them and, in some cases, have

instituted special enquiries for the purpose. In particular, various Electricity undertakings have made available for the Survey details of the industrial consumption of electric power. In the numerous industries investigated it was usual to find a keen desire to assist among Employers' Organisations, Trade Unions, and private Employers, and thanks are due to the many who have assisted by providing information which has served for the present enquiry, and will serve as a basis for future enquiries.

G. W. DANIELS.

INTRODUCTION.

The Terms of Reference.—When the Universities of Liverpool and Manchester were invited, in March, 1931, to conduct an Industrial Survey of Lancashire, the terms of reference were designedly left fairly wide in order that the final reports should cover as large a field as was possible in the time available, and should embody a study of those matters which the investigators believed to be most closely bound up with the industrial future of the county. It was, however, implied that, within this wide field of research, emphasis should be placed upon the question of employment and unemployment and that other matters of great importance, such as changes in the internal structure of industries, and technical developments, should be dealt with only in so far as they react upon the present or probable future supply of and demand for labour.

The work of the Survey, therefore, fell naturally into two parts. It was necessary, in the first place, to determine what amount of labour in the several industries in the area could be regarded as surplus; what causes had led to its appearance; what characteristics the surplus possessed which might affect the possibility of its transfer or absorption; what indications there were of a natural drainage by migration of the over-supply of labour; and to what degree those trends in the supply of and demand for labour which could be forecasted indicated an approaching modification of the problem.

The second phase of the work was concerned with the steps which might be taken, by conscious policy, to deal with the semi-permanent pools of unemployed workers, and, in this connection, attention has been particularly directed to the question of the development of new businesses and industries within the area. The forces which ultimately determine the localisation of industry are complex and difficult to identify in practice, and even when the measurable factors—such as the price and quality of labour, the cost of power, the convenience of sites, the level of local rates, or the proximity to markets—have been eliminated, there still remain many elements, psychological or entirely non-economic, which perhaps have as great an influence upon the appearance and disappearance of businesses and industries as do the purely economic forces.

No effort has been made, therefore, to determine what are the relative advantages of Lancashire and other parts of the country as locations for particular concerns or industries. Questions of this kind are matters of business policy; answers to them would vary from one concern to another, following the peculiar circumstances of each, and, generally speaking, they are not susceptible to quantitative treatment. There are, nevertheless, certain aspects of the growth of the smaller industries in Lancashire upon which it has

been possible to throw some light. How far, for example, have the smaller and "newer" industries been growing in the area since the end of the War? Can expansion in them bring substantial relief to the labour in the depressed industries? Are the vital ancillary services, such as electric power supply, meeting the demands of industry efficiently and with imagination? What general changes in the industrial environment are possible and desirable in order to make the area more capable of supporting fresh industrial growth?

It would be a mistake to assume, however, that the great staple industries of Lancashire have now stabilised their position and that the growth of new industries will constitute a net enlargement of the economic activity of the area. The older industries, no less than the newer, are in a stage of transition, and the future of the area is bound up as closely with movements in the older industries as with those in the newer. In the second part of the work of the Survey, therefore, it has been necessary to consider how far the older industries might increase their demand for labour.

The Extent of the Survey Region.—The area upon which the Universities of Liverpool and Manchester were asked to report was roughly described as "Industrial Lancashire". At an early stage in the investigations it became apparent that the most convenient form of collaboration between the Universities would be through a division of territory which would leave to Liverpool University the trading, commercial and distributive activities around that city, and to Manchester University the area of manufacturing industries in the county of Lancashire and the adjoining fringes of Cheshire and Derbyshire. This division had the advantage of enabling each University to work in the area of which it had local knowledge and in which it had already carried out economic or social research.

The "Survey Region" of Manchester University comprises that part of Lancashire which lies to the south of a line running eastwards from Lancaster to the county boundary, and to the east of a line following the coast from Lancaster to Preston and thence through St. Helens to Runcorn. In the south the industrial and residential fringe of Cheshire and Derbyshire, which economically is bound up with Lancashire, is also included.* At the 1931 Census this Region contained 4,214,809 persons (10.6 per cent. of the total in England and Wales), and at July, 1930, 1,488,510 persons insured under the Unemployment Insurance Acts (12.0 per cent. of the total in Great Britain and Northern Ireland).

For some purposes it has been necessary to break up the Region into Sub-Areas, and these, shown in the map given in the front of

* See map facing p. iv.

the Report, have been chosen so as to group together, as far as possible, industrial activity of the same nature.*

Although in many cases the statistics available related strictly to the Survey Region, in others information had to be collected for slightly different areas. The Employment Exchange areas for which figures of insured population, unemployed persons, etc., were obtained, occasionally overrun the boundaries of the Region, but not to any important degree. In the case of coalmining, certain series relate to "Lancashire and Cheshire". The Census of Production uses the area "Lancashire with North Cheshire and the Glossop and New Mills Districts of Derbyshire", which includes North Lancashire, Cumberland and Westmorland, and the Liverpool University Survey Region. Certain statistics of the Ministry of Labour were available only for the North-Western Division. In the study of electricity supply it was found that the boundaries of some authorised undertakings overrun those of the Survey Region. In many cases, in asking for special returns from the Lancashire County Council or from private businesses, information only for the whole of Lancashire was available. And on many other occasions the strictly defined Survey Region has been discarded. The multiplicity of statistical boundaries would, of course, have rendered any region chosen subject to these difficulties. It is not likely, however, that the general conclusions of the Survey will be invalidated in any serious way by these boundary difficulties.

The Plan of the Report.—This Report consists of two parts. Part I embodies the summarised conclusions of the present position and a discussion of the long-period remedies which might be applied to deal with surplus labour. Part II consists of a series of chapters treating of the manifold phases of the economic activity of the Region upon which the conclusions are based. It cannot be overstressed that the generalisations of Part I are based on statistics often subject to important qualifications which have prevented the findings from being more precise. An attempt has been made in Part II to detail these qualifications and to indicate what degree of validity, among the infinite gradations of reliability that any group of statistics may claim, attaches to each series employed.

* The Sub-Areas are based upon Employment Exchange areas. Unfortunately there have been certain modifications in these areas since 1923, which introduce error in comparisons over a period. These modifications are described in detail on p. 86.

APPENDIX I.

TABLE I.—*Population of Lancashire and England and Wales. 1801-1931.*

Year.	Lancashire.			England and Wales.			Percentage of Population in Lancashire.
	Population.	Intercensal Increase.		Population.	Intercensal Increase.		
		Number.	Per cent.		Number.	Per cent.	
1801	673,486	—	—	8,892,536	—	—	7·6
1811	828,499	155,013	23·0	10,164,256	1,271,720	14·30	8·2
1821	1,052,948	224,449	27·1	12,000,236	1,835,980	18·06	8·8
1831	1,336,854	283,906	27·0	13,895,797	1,896,561	15·80	9·6
1841	1,667,054	330,200	24·7	15,914,148	2,017,351	14·52	10·5
1851	2,031,236	364,182	21·8	17,927,609	2,013,461	12·65	11·3
1861	2,429,440	398,204	19·6	20,066,224	2,138,615	11·90	12·1
1871	2,819,495	390,055	16·1	22,712,266	2,645,042	13·13	12·4
1881	3,454,438	634,943	22·5	25,974,439	3,282,173	14·45	13·3
1891	3,926,760	472,322	13·7	29,002,525	3,028,086	11·65	13·54
1901*	4,406,409	479,649	12·2	32,527,843	3,525,318	12·17	13·55
1901†	4,368,989	—	—	—	—	—	—
1911	4,756,644	387,655	8·9	36,070,492	3,542,649	10·9	13·2
1921	4,927,484	170,840	3·6	37,886,692	1,816,207	5·04	13·0
1931	5,039,097	106,146	2·2	39,947,931	2,061,232	5·4	12·6

* Ancient County.

† Administrative County.

The figures for 1801-1901 are from the Census of 1911 (Summary Tables, p. 3): they relate to the Parliamentary Counties as constituted in 1885. Those for 1911 and 1921 are taken from the Census of 1921 (General Tables, p. 3): they refer to the Administrative Counties.

TABLE II.—*Intercensal Increases in the Population of Lancashire. 1851-1921. Net Gain or Loss by Migration, and Percentage of Increase due to Migration.*

Year.	Intercensal Increase.	Estimated Excess of Births over Deaths.	Gain or Loss by Migration.	Percentage of Migration to Net Increase.
1851-61 ...	398,065	254,178	143,887	36
1861-71 ...	383,893	287,961	95,932	25
1871-81 ...	636,560	418,798	217,762	34
1881-91 ...	472,087	448,538	23,549	5
1891-1901 ...	477,368	436,417	40,951	9
1901-11 ...	387,655	484,762	— 97,107	— 25
1911-21 ...	170,840	334,046	— 163,206	— 96

The intercensal increases shown in this table have been obtained from the returns of each successive Census. Because of changes in the county boundaries they show divergencies from those in Table I.

TABLE III.—*Distribution of Population within the Survey Region.*

Year.	Population.		Percentage of Population.	
	North and East.	South and West.	North and East.	South and West.
1851 ...	821,305	617,819	57·1	42·9
1861 ...	986,706	734,076	57·4	42·6
1871 ...	1,105,550	851,993	56·5	43·5
1881 ...	1,333,383	1,049,102	55·9	44·1
1891 ...	1,526,475	1,214,946	55·7	44·3
1901 ...	1,664,792	1,393,519	54·4	45·6
1911 ...	1,777,038	1,547,119	53·5	46·5
1921 ...	1,747,107	1,588,511	52·4	47·6

TABLE IV.—Changes in Population in Employment Exchange Areas. 1901–1921.

District.	Population.			Percentage to Total Population.		
	1901.	1911.	1921.	1901.	1911.	1921.
I. Blackburn	283,894	299,416	288,305	7·7	7·4	7·0
II. Burnley	197,429	222,165	216,159	5·4	5·5	5·2
III. Bacup	72,101	71,553	67,125	2·0	1·8	1·6
Total Weaving Area	553,424	593,134	571,589	15·0	14·7	13·8
IV. Preston	224,839	241,109	254,694	6·1	6·0	6·2
V. Bolton	321,971	348,437	347,029	8·7	8·6	8·4
VI. Rochdale	276,002	278,452	274,371	7·5	6·9	6·6
VII. Oldham	247,926	269,702	268,570	6·7	6·7	6·5
VIII. Stalybridge	334,919	365,921	367,213	9·1	9·1	8·9
Total Spinning Area	1,405,657	1,503,621	1,511,877	38·1	37·3	36·6
IX. Wigan	258,440	280,106	283,263	7·0	6·9	6·8
X. St. Helens	276,464	315,391	334,629	7·5	7·8	8·1
Total Coal and Chemical Area	534,904	595,497	617,892	14·5	14·7	14·9
XI. Trafford Park	367,315	413,067	427,610	10·0	10·2	10·3
XII. Manchester	672,661	748,457	766,677	18·2	18·6	18·5
Total Engineering and Dress Area.	1,039,976	1,161,524	1,194,287	28·2	28·8	28·9
XIII. Lancaster	155,772	182,155	242,468	4·2	4·5	5·9
GRAND TOTAL	3,689,733	4,035,931	4,138,113	100	100	100

TABLE V.—Increase or Decrease of Population, Natural Increase and Gain or Loss by Migration in Eighteen Registration Districts, 1891–1901.

Registration District.	Increase.	Excess of Births over Deaths.	Gain (+) or Loss (–) by Migration.
Preston	8,690	11,916	– 3,226
Blackburn	18,617	21,155	– 2,538
Burnley	31,800	22,152	+ 9,648
Haslingden	5,480	9,328	– 3,848
Chorley	7,943	7,278	+ 665
Bolton	30,788	28,835	+ 1,953
Bury	3,462	9,424	– 5,962
Rochdale	7,647	6,158	+ 1,389
Oldham	13,507	15,486	– 1,979
Ashton-under-Lyne ...	11,131	13,762	– 2,631
Total for North and East	139,065	145,494	– 6,429
Wigan	24,477	31,811	– 7,334
Warrington	16,488	15,854	+ 634
Leigh	15,486	12,941	+ 2,545
Chorlton	42,778	34,037	+ 8,741
Salford	24,928	23,261	+ 1,667
Prestwich	42,906	11,599	+ 31,307
Manchester	–12,784	13,028	– 25,812
Barton-upon-Irwell ...	21,303	11,193	+ 10,110
Total for South and West	175,582	153,724	+ 21,858

TABLE VI.—Increase or Decrease of Population, Natural Increase, and Gain or Loss by Migration in Eighteen Registration Districts, 1901–11.

Registration District.	Increase.	Excess of Births over Deaths.	Gain (+) or Loss (–) by Migration.
Preston	9,058	13,227	– 4,169
Blackburn	12,025	18,708	– 6,683
Burnley	24,700	18,880	+ 5,820
Haslingden	1,359	7,756	– 6,397
Chorley	6,792	7,677	– 885
Bolton	18,340	27,877	– 9,537
Bury	3,785	8,746	– 4,961
Rochdale	8,665	6,392	+ 2,273
Oldham	19,957	16,991	+ 2,966
Ashton-under-Lyne ...	6,641	13,641	– 7,000
Total for North and East	111,322	139,895	– 28,573
Wigan	14,716	31,368	– 16,652
Warrington	13,999	15,390	– 1,391
Leigh	9,421	13,353	– 3,932
Chorlton	49,601	41,006	+ 8,595
Salford	11,873	27,326	– 15,453
Prestwich	44,685	19,220	+ 25,465
Manchester	– 18,551	14,550	– 33,101
Barton-upon-Irwell ...	27,856	14,403	+ 13,453
Total for South and West	153,600	176,616	– 23,016

TABLE VII.—*Increase or Decrease of Population, Natural Increase, and Gain or Loss by Migration in Thirteen Employment Exchange Areas, 1911-21.*

District.	Increase or Decrease.	Excess of Births over Deaths.	Gain (+) or Loss (-) by Migration.
I. Blackburn	-11,111	+10,083	-21,194
II. Burnley	- 6,006	+ 8,631	-14,637
III. Bacup	- 4,428	+ 1,416	- 5,844
Weaving Area	-21,545 -3·6 per cent.	+20,130 +3·4 per cent.	-41,675 -7·0 per cent.
IV. Preston	+13,585	+23,557	- 9,972
V. Bolton	- 1,408	+21,760	-23,168
VI. Rochdale	- 4,081	+ 6,016	-10,097
VII. Oldham	- 1,132	+11,526	-12,658
VIII. Stalybridge	+ 1,292	+12,533	-11,241
Spinning Area	+ 8,256 +0·5 per cent.	+75,392 +5·0 per cent.	-67,136 -4·5 per cent.
IX. Wigan	+ 3,157	+31,284	-28,127
X. St. Helens	+19,238	+37,528	-18,290
Coal and Chemical Area.	+22,395 +3·8 per cent.	+68,812 +11·6 per cent.	-46,417 -7·8 per cent.
XI. Trafford Park	+14,543	+30,362	-15,819
XII. Manchester	+18,220	+55,716	-37,496
Engineering and Dress Area.	+32,763 +2·8 per cent.	+86,078 +7·4 per cent.	-53,315 -4·6 per cent.
XIII. Lancaster	+60,313 +31·1 per cent.	+ 6,022 +3·3 per cent.	+54,291 +29·8 per cent.

TABLE VIII.—*Occupied, Retired or Unoccupied, and Total Population of Lancashire and England and Wales.*

	LANCASHIRE.			ENGLAND AND WALES.			Percentage of Lancashire to England and Wales.		
	Occupied.	Retired or Unoccupied.	Total.	Occupied.	Retired or Unoccupied.	Total.	Occupied.	Retired or Unoccupied.	Total.
1891	1,914,545	1,093,905	3,008,450	12,899,464	9,154,378	22,053,837	14·8	11·9	13·6
1901	2,089,924	1,329,043	3,418,967	14,328,727	10,995,117	25,323,844	14·6	12·1	13·5
1911	2,330,773	1,444,246	3,775,019	16,284,399	12,234,914	28,519,313	14·3	11·8	13·2
1921	2,447,960	1,422,858	3,870,818	17,178,050	12,422,863	29,600,913	14·3	11·5	13·1

The figures for 1921 relate to persons of 12 years and upwards. Those for earlier years to persons of 10 years and upwards.

TABLE IX.—*Relation of Occupied to Total Population aged 10 years and upwards—Males.*

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Occupied.	Total.	Percentage Occupied.	Occupied.	Total.	Percentage Occupied.
1891 ...	1,239,194	1,434,446	86.4	8,883,254	10,591,967	83.9
1901 ...	1,395,833	1,626,721	85.8	10,156,976	12,134,259	83.7
1911 ...	1,538,937	1,789,336	86.0	11,453,665	13,662,200	83.8
1921* ...	1,614,243	1,803,765	89.5	12,112,718	13,901,108	87.1

* For 1921 aged 12 years and upwards.

TABLE X.—*Relation of Occupied to Total Population aged 10 years and upwards—Females.*

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Occupied.	Total.	Percentage Occupied.	Occupied.	Total.	Percentage Occupied.
1891 ...	695,351	1,574,004	42.9	4,016,210	11,461,870	35.0
1901 ...	694,091	1,792,246	38.9	4,171,751	13,189,585	31.6
1911 ...	791,836	1,985,683	39.9	4,830,734	14,857,113	32.5
1921* ...	833,717	2,067,053	40.3	5,065,332	15,699,805	32.3

* For 1921 aged 12 years and upwards.

TABLE XI.

Occupied, Retired or Unoccupied, and Total Population of 10 years and upwards in Lancashire expressed as percentages of the corresponding numbers in England and Wales.

Year.	Males.			Females.		
	Occupied.	Retired or Unoccupied.	Total.	Occupied.	Retired or Unoccupied.	Total.
1891 ...	13.9	11.4	13.5	16.8	12.1	13.7
1901 ...	13.7	11.7	13.4	16.6	12.2	13.6
1911 ...	13.4	11.3	13.1	16.4	11.9	13.4
1921 ...	13.3	10.6	13.0	16.5	11.6	13.2

TABLE XII.

Numbers Occupied in the Cotton Industry.

Year.	LANCASHIRE.			ENGLAND AND WALES.			Percentage of Total in Lanca.
	Males.	Females.	Total.	Males.	Females.	Total.	
1861 ...	153,490	202,701	356,191	197,572	259,074	456,646	78.0
1871 ...	148,813	227,234	376,047	188,272	279,870	468,142	80.3
1881 ...	150,779	249,799	400,578	185,410	302,367	487,777	82.1
1891 ...	178,175	281,799	459,974	213,231	332,784	546,015	84.2
1901 ...	162,304	274,373	436,677	196,898	332,233	529,133	82.5
1911 ...	193,652	309,981	503,633	233,380	371,797	605,177	83.2

TABLE XIII.
Percentage Increase or Decrease of Cotton Operatives in each Decade.

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Males.	Females.	Total.	Males.	Females.	Total.
1861-71 ...	- 3.1	+12.1	+ 5.6	- 4.7	+ 8.0	+ 2.5
1871-81 ...	+ 1.3	+ 9.9	+ 6.5	- 1.6	+ 8.0	+ 4.2
1881-91 ...	+18.2	+12.8	+14.8	+15.0	+10.1	+11.9
1891-1901	- 8.9	- 2.6	- 5.1	- 7.7	- 0.2	- 3.1
1901-11 ...	+19.3	+13.0	+15.3	+18.5	+11.9	+14.4

TABLE XIV.
Lancashire Cotton Operatives. Numbers Occupied
at each Age Group, 1891, 1901 and 1911.

Age Group.	Numbers of Males.			Increase or Decrease per cent.	
	1891.	1901.	1911.	1891-1901.	1901-1911.
10-15 ...	36,240	23,759	24,683	-34.4	3.9
15-20 ...	44,153	35,766	45,666	-19.0	27.7
20-25 ...	30,900	27,627	32,599	-10.6	18.0
25-35 ...	44,030	45,169	48,223	2.6	6.8
35-45 ...	28,267	32,913	39,247	16.4	19.2
45-55 ...	17,651	19,693	26,870	11.6	36.4
55-65 ...	8,891	9,316	12,588	4.8	35.1
65- ...	3,099	2,655	3,504	-14.3	32.0
	213,231	196,898	233,380	- 7.7	18.5

Numbers of Females.					
10-15 ...	49,166	36,114	36,084	-26.5	- 0.1
15-20 ...	92,092	91,408	94,792	- 0.7	3.7
20-25 ...	68,118	75,400	76,661	10.7	1.7
25-35 ...	70,383	74,277	89,617	5.5	20.7
35-45 ...	32,895	35,130	45,530	6.8	29.6
45-55 ...	14,688	14,490	21,344	- 1.3	47.3
55-65 ...	4,474	4,587	6,450	2.5	40.6
65- ...	968	827	1,319	-14.6	59.5
	332,784	332,233	371,797	- 0.2	11.9

TABLE XV.
Numbers Occupied in the Dress Trades.

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Males.	Females.	Total.	Males.	Females.	Total.
1871 ...	42,733	49,249	91,982	426,470	579,391	1,005,861
1881 ...	42,044	67,227	109,271	404,096	644,438	1,048,534
1891 ...	44,175	83,960	128,135	445,000	736,514	1,181,514
1901 ...	47,746	95,437	143,183	447,946	777,653	1,225,599
1911 ...	50,177	105,604	155,781	461,208	835,883	1,297,091

Following the practice of the Census of 1911, wig makers and hairdressers, who are included under the Order in the earlier Censuses, have been omitted, as also have laundry-keepers. The figures include, however, drapers, linen drapers, and mercers.

TABLE XVI.
Percentage Increase or Decrease of number occupied in the Dress Trades in Lancashire.

—			Males.	Females.	Total.
1871-81 ...	...	...	- 1.6	+ 36.5	+ 18.8
1881-91 ...	...	...	+ 5.1	+ 24.9	+ 17.3
1891-1901 ...	...	...	+ 8.1	+ 13.7	+ 11.7
1901-11 ...	...	...	+ 5.1	+ 10.7	+ 8.8

TABLE XVII.
Numbers occupied in the Coal Industry.

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Males.	Females.	Total.	Males.	Females.	Total.
1861 ...	41,764	717	42,481	246,613	3,763	250,376
1871 ...	45,634	30	45,664	268,091	3,251	271,342
1881 ...	59,557	1,244	60,801	378,664	3,099	381,763
1891 ...	77,509	2,037	79,546	513,843	3,267	517,110
1901 ...	86,539	2,033	88,572	640,939	2,665	643,654
1911 ...	100,739	2,378	103,117	874,304	2,843	877,147
1921 ...	106,862	2,331	109,193	990,409	3,059	993,468

TABLE XVIII.
Percentage Increase in Males occupied in the Coal Industry.

Year.	Lancashire.	England and Wales.
1861-71 ...	9.3	8.7
1871-81 ...	30.5	41.2
1881-91 ...	30.1	35.7
1891-1901 ...	11.7	24.7
1901-11 ...	16.4	36.4
1911-21 ...	6.1	13.3

TABLE XIX.
*Numbers Occupied in the Metal, Engineering and Machine-Making Trades
 in Lancashire.*

Year.	Males.	Females.	Total.	Percentage Increase of Males.
1881	112,296	1,253	113,549	—
1891	132,431	1,995	134,426	18·0
1901	174,650	3,016	177,666	32·0
1911	205,284	6,308	211,592	17·5

TABLE XX.
*Numbers Occupied in the Paper and Printing Trades in Lancashire and
 England and Wales.*

Year.	LANCASHIRE.			ENGLAND AND WALES.		
	Males.	Females.	Total.	Males.	Females.	Total.
1861	8,313	1,668	9,981	69,762	18,184	87,946
1871	11,427	3,303	14,730	94,042	24,760	118,802
1881	15,497	5,890	21,387	116,520	41,711	158,231
1891	21,007	8,948	29,955	156,337	63,212	219,549
1901	25,725	13,051	38,776	188,057	90,900	278,957
1911	29,548	17,493	47,041	226,451	121,576	348,027

The figures include (1) Circular, Envelope-Addressers, (2) Bill-Posters, and (3) Advertising, Bill-Posting agents.

TABLE XXI.
*Numbers Occupied in the Manufacture of Chemicals, Oils, Grease, Soap, Resin, etc.
 (including the making of elastic web and celluloid) in Lancashire.*

Year.	Males.	Females.	Total.
1861	6,343	226	6,569
1871	9,395	922	10,317
1881	11,541	1,280	12,821
1891	16,668	2,638	19,306
1901	21,445	5,570	27,015
1911	28,876	8,617	37,493

APPENDIX 2.

TABLE I.

Geographical Distribution of Insured Unemployed Persons in All Industries in Survey Region—1923, 1927 and 1929.

Sub-Area.	1923.					1927.					1929.				
	Men.	Boys.	Women.	Girls.	Total.	Men.	Boys.	Women.	Girls.	Total.	Men.	Boys.	Women.	Girls.	Total.
Blackburn, etc. ...	8·0	9·1	12·2	7·8	9·5	6·4	5·9	10·6	6·5	7·6	9·1	8·5	13·9	8·9	10·7
Bacup, etc. ...	1·4	1·7	2·0	1·5	1·6	1·8	2·0	3·3	2·2	2·2	1·8	2·3	2·6	1·9	2·1
Oldham, etc. ...	13·0	19·4	15·2	17·1	14·0	12·3	10·2	13·5	10·2	12·6	8·5	7·8	9·6	7·7	8·9
Littleborough, Bury, etc.	7·6	9·0	10·1	10·5	8·6	5·8	5·4	7·1	6·9	6·2	5·4	4·2	7·0	4·4	5·9
Stalybridge, Hyde, etc.	10·4	10·9	12·8	11·5	11·3	7·5	6·6	10·7	10·4	8·4	8·5	8·3	10·7	10·5	9·2
Bolton, Leigh, etc. ...	7·4	6·4	7·2	8·4	7·3	10·8	8·0	8·1	6·5	9·9	12·3	15·6	11·8	14·9	12·2
Atherton, Wigan, etc.	2·5	2·5	6·5	11·6	4·2	9·5	14·0	7·5	11·9	9·0	10·2	11·4	6·9	12·0	9·1
St. Helens, Runcorn, etc.	6·9	3·3	1·4	2·9	4·8	8·9	11·3	2·0	7·3	7·0	7·8	9·6	2·2	8·4	6·0
Chorley, Preston ...	4·8	4·7	5·9	4·8	5·3	4·8	4·4	5·8	4·8	5·1	5·7	4·9	6·4	4·6	5·9
Trafford Park, Eccles, etc.	8·2	9·0	5·1	7·5	7·1	7·4	9·7	6·8	11·5	7·3	6·9	6·6	5·9	6·3	6·5
Lancaster, etc. ...	1·7	1·0	1·4	1·5	1·5	2·6	2·8	2·3	2·9	2·5	2·9	1·6	2·0	4·0	2·6
Burnley, Nelson, Colne.	5·4	5·4	8·3	4·9	6·4	3·4	2·9	6·2	2·8	4·2	4·1	3·0	5·9	2·8	4·7
Levenshulme, Man- chester, etc.	22·7	17·6	11·9	10·0	18·4	18·8	16·8	16·1	16·1	18·0	16·8	16·2	15·1	13·6	16·2
TOTAL ...	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

TABLE II.
*Percentage Distribution of Insured Unemployed Persons in Survey Region.
 1923 and 1929.**

Industry.	1923.			1929.		
	Males.	Females.	Total.	Males.	Females.	Total.
Cotton	24.2	79.0	45.2	17.4	65.6	34.2
Coal Mining	3.4	0.2	2.2	15.9	0.7	10.6
Glass	0.5	0.1	0.3	0.7	0.2	0.5
Chemicals	1.9	0.3	1.3	1.2	0.3	0.9
Oil, Glue, etc.	0.3	0.1	0.2	0.2	0.2	0.2
Steel Melting, etc.	1.5	—	0.9	2.2	—	1.5
Wire and Wire Netting	0.6	0.1	0.4	0.6	0.1	0.4
General Engineering	23.7	0.4	14.7	13.1	0.7	8.7
Electrical Engineering	0.7	0.1	0.5	0.8	0.3	0.6
Motor Vehicles	1.4	0.1	0.9	1.0	0.1	0.7
Railway Carriages	0.3	—	0.2	0.4	—	0.3
Electric Cables, etc.	0.4	0.2	0.3	0.4	0.3	0.4
Metals N.S.S.	0.3	0.2	0.3	0.4	0.2	0.4
Woollen and Worsted	0.3	0.6	0.4	0.3	0.8	0.5
Finishing Textile	4.3	1.9	3.4	5.6	3.3	4.8
Tailoring	0.7	2.3	1.3	0.7	2.6	1.3
Dress Making, etc.	0.1	1.5	0.6	0.1	1.1	0.4
Hats and Caps	0.7	0.8	0.7	0.4	0.9	0.5
Shirts, Underclothing	—	1.0	0.4	0.1	0.8	0.3
Boots, Shoes	0.7	0.4	0.6	0.8	1.0	0.9
Bread, Cakes	0.8	0.6	0.7	0.5	0.7	0.6
Drink	0.3	0.3	0.3	0.4	0.3	0.3
Paper and Paper Board	0.8	0.2	0.6	0.4	0.2	0.3
Printing and Publishing	0.5	0.5	0.5	0.5	0.8	0.6
Building	5.8	—	3.6	8.2	—	5.4
Rubber	1.1	1.1	1.1	0.9	1.6	1.2
Gas, Water, Electricity	1.2	—	0.8	1.2	—	0.8
Railway Service	1.0	—	0.7	0.5	—	0.3
Tram and 'Bus	0.3	—	0.2	0.5	—	0.3
Other Road Transport	2.1	—	1.3	1.8	—	1.2
Dock, Harbour, etc.	1.1	—	0.7	1.7	—	1.1
Distribution	3.9	2.7	3.5	5.9	5.1	5.6
Commerce, etc.	0.3	0.1	0.2	0.2	0.1	0.1
National Government	1.0	0.1	0.6	0.6	0.1	0.4
Local Government	0.8	—	0.5	2.1	0.1	1.4
Prof. Services	0.2	0.1	0.2	0.2	0.1	0.2
Hotel, etc.	0.5	2.0	1.1	0.7	3.1	1.5
Other Industries	12.4	2.8	8.7	11.4	8.9	10.5
Total	100	100	100	100	100	100

* The 37 industries included above are those with over 6,000 insured employed persons in 1923.

APPENDIX 3.

TABLE I.

Insured-Employed Persons at June 1929 in each of 101 Industries in the Survey Region and their Relation to Total "Insured Employed" in Great Britain and Northern Ireland.

Industry.	Insured-Employed in Survey Region.	Percentage of Insured-Employed in Great Britain and N. Ireland.
Fishing	2,574	10·1
Coal Mining	57,188	6·6
Iron Ore Mining, etc.	5	—
Lead, Tin and Copper Mining	—	—
Stone Quarrying and Mining	1,370	3·5
Slate Quarrying	276	3·0
Mining and Quarrying N.S.S.	430	2·8
Clay, Sand, Chalk, Gravel, etc.	95	0·6
Coke Ovens, etc.	315	2·9
Artificial Stone and Concrete	2,366	15·6
Cement, Lime Kilns, etc.	30	0·2
Brick, Tile, etc. Making	4,986	6·7
Pottery, Earthenware, etc.	1,323	2·1
Glass (excl. bottles, etc.)	9,319	36·9
Glass Bottles	4,080	27·7
Chemicals	17,126	17·2
Explosives	345	2·0
Paint, Varnish, etc.	1,519	8·4
Oil, Glue, Soap, etc.	7,462	10·8
Pig Iron	—	—
Steel Melting, Rolling, etc.	6,307	4·4
Brass, Copper, etc.	2,794	7·6
Tin Plates	45	0·2
Iron and Steel Tubes	225	0·8
Wire, Wire Netting, etc.	6,958	34·3
General Engineering	87,560	16·4
Electrical Engineering	18,718	23·2
Marine Engineering	515	1·0
Constructional Engineering	2,376	9·4
Motor Vehicles	12,100	5·3
Carriages, Carts, etc.	1,346	7·7
Railway Carriages, etc.	6,271	12·7
Shipbuilding and Repairing	1,095	0·7
Stove, Grate, Pipe, etc.	5,530	6·9
Electrical Wiring, etc.	1,024	6·6
Electric Cables	10,074	11·2
Hand Tools, Cutlery... ..	510	1·8
Bolts, Nuts, Screws, etc.	1,435	6·2
Brass and Allied Metals	1,009	3·9
Heating and Ventilating Apparatus	392	4·7
Watches, Clocks, etc.	731	1·9
Metal Industries N.S.S.	8,686	4·9

TABLE I—cont.

Industry.	Insured Employed in Survey Region.	Percentage of Insured Employed in Great Britain and N. Ireland.
Cotton	400,856	83·7
Woolen and Worsted	6,109	3·0
Silk and Artificial Silk	7,141	10·5
Linen	205	0·3
Jute	34	0·1
Hemp, Rope, etc.	2,289	13·6
Hosiery	2,231	2·2
Lace	144	0·9
Carpets	586	2·5
Textiles N.S.S.	7,549	18·0
Textile Bleaching, Dyeing, etc	43,158	43·0
Tanning, Currying, etc.	6,559	17·4
Leather Goods	962	4·0
Tailoring	23,753	12·5
Dress Making and Millinery	8,814	8·8
Hats and Caps	10,849	32·2
Shirts, Underclothing	16,577	21·4
Dress Industries N.S.S.	2,066	7·9
Boots, Shoes	8,442	7·2
Bread, Cakes	13,580	10·0
Grain Milling	2,069	7·5
Cocoa, Sugar Confectionery	4,149	6·3
Food Industries N.S.S.	6,228	6·1
Drink Industries	7,390	7·3
Tobacco, Cigar, etc.	1,396	3·2
Sawmilling, etc.	3,414	6·4
Wood Boxes, etc.	2,271	19·9
Furniture	7,299	6·4
Wood Working, etc.	1,644	7·8
Paper and Paper Board, etc.	8,050	15·2
Cardboard Boxes, etc.	6,078	10·9
Wallpaper Making	1,745	29·2
Stationery Requisites	281	4·7
Printing, Publishing, etc.	22,513	9·0
Building	55,940	7·4
Public Works Contracting	6,076	4·5
Rubber	14,413	23·7
Oilcloth, Linoleum	4,828	36·9
Brushes and Brooms	694	7·7
Scientific Instruments	921	3·6
Musical Instruments... ..	363	1·4
Toys, Games, etc.	450	3·8
Gas, Water and Electricity	16,771	10·9
Railway Service	10,934	8·3
Tram and 'Bus Service	18,948	12·6
Road Transport N.S.S.	11,500	7·1
Shipping Service	1,842	1·5
Dock, Harbour, etc.	6,894	5·9
Transport, etc. N.S.S.	880	5·4
Distributive Trades	134,836	8·5

TABLE I—*cont.*

Industry.	Insured Employed in Survey Region.	Percentage of Insured Employed in Great Britain and N. Ireland.
Commerce, Banking, etc.	4,864	2·2
National Government	5,081	4·6
Local Government	22,729	9·0
Professional Services	8,452	7·1
Entertainments, etc.	7,351	11·1
Hotel, Club, etc.	17,521	5·6
Laundries, Dyeing, etc.	8,431	6·5
Industries and Services, N.S.S.	5,019	4·9
Total	1,288,679	11·8

TABLE II.

Insured-Employed in Survey Region at June, 1929, in All Industries and in "Manufacturing, Mining and Building," and their Relation to Insured Employed in Great Britain and Northern Ireland.

	Total Insured Employed.	Insured Employed in "Manufacturing, Mining and Building."
Survey Region	1,288,679	1,004,052
Great Britain and Northern Ireland.	10,930,343	7,150,068
Percentage Survey Region to Great Britain.	11·8	14·0

TABLE III.

*Census of Production, 1924.**"Lancashire with N. Cheshire and the Glossop and New Mills Districts of Derbyshire" as Percentage of United Kingdom.*

Trade.	Persons Employed.							
	Gross Output.	Net Output.	Operative Staff.			Administrative, Clerical and Technical Staff.	Total Employed.	Horse Power of Prime Movers.
			Males.	Females.	Total.			
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Iron and Steel	14.4	15.4	15.2	10.6	14.7	15.6	14.8	11.6
Non-Ferrous Metals	13.4	7.1	6.3	3.3	5.5	5.2	5.5	8.3
Textiles	49.4	43.2	49.0	44.0	46.0	35.1	45.4	62.9
Clothing	15.2	14.4	13.4	16.1	15.3	14.0	15.2	16.1
Food, etc.	17.5	16.0	14.3	15.9	15.0	15.2	15.0	17.8
Chemicals	27.0	28.7	29.6	24.2	28.4	27.0	28.1	21.7
Paper	15.6	14.3	13.8	15.0	14.3	12.3	14.0	18.3
Timber	12.2	11.6	11.5	12.7	11.7	12.7	11.8	12.9
Leather, etc.	28.1	25.8	24.2	23.8	24.0	21.9	23.7	30.7
Building, etc.	12.8	12.7	12.1	7.1	11.7	14.1	11.9	15.6
Mines	12.4	12.4	13.0	44.5	13.2	13.5	13.2	14.3
Miscellaneous	15.7	14.0	12.9	8.7	11.4	10.9	11.3	24.2
Public Utilities	14.7	15.3	14.6	13.6	14.6	14.6	14.6	20.6
All Trades	22.8	19.0	17.4	27.2	20.0	17.2	19.7	22.9

TABLE IV.

Index of Numbers of Insured Employed Persons in (a) Survey Region and (b) Great Britain and Northern Ireland at June 1923, 29, 30, 31 for each of the "Expanding Industries" showing more than a 10 per cent. increase in numbers of Insured Employed in Great Britain and Northern Ireland between 1923 and 1929. (1923 = 100).*

Industry.	Great Britain and Northern Ireland.				Survey Region.			
	1923.	1929.	1930.	1931.	1923.	1929.	1930.	1931.
Silk and Artificial Silk	100	194·2	174·4	147·1	100	535·3	435·5	500·9
Electrical Wiring	100	155·4	167·4	193·2	100	202·8	210·3	206·9
Artificial Stone	100	167·6	160·5	168·2	100	532·9	523·1	451·1
Heating and Ventilating Apparatus ...	100	158·8	159·8	146·2	100	117·4	112·9	109·3
Tram and 'Bus Service... ..	100	143·7	149·9	157·9	100	266·5	270·1	284·6
Scientific Instrument	100	154·7	148·4	138·1	100	183·8	215·8	205·0
Electrical Engineering	100	141·7	146·1	139·1	100	134·4	138·4	122·1
Public Works	100	130·4	140·6	204·7	100	116·0	138·7	251·5
Electric Cables	100	137·9	145·1	143·0	100	150·6	152·2	143·4
Paint, Varnish, etc.	100	139·9	138·8	142·2	100	121·3	116·0	116·1
Distribution	100	134·4	137·4	141·7	100	125·2	125·6	129·7
Brick, Tile, etc.	100	133·2	132·5	131·2	100	138·5	129·7	140·6
Clay, Sand, etc.	100	127·3	132·6	117·2	100	123·4	102·6	80·5
Hotels, etc.	100	133·6	133·3	139·4	100	128·3	117·5	119·8
Road Transport N.S.S.	100	132·5	131·8	138·1	100	115·2	115·3	115·3
Furniture	100	129·8	128·9	125·6	100	122·9	119·0	125·4
Stationery Requisites	100	133·3	130·9	123·0	100	1,652·9	2,517·6	2,111·8

Laundries, etc.	100	128·6	130·2	133·6	100	166·7	158·2	154·5
Local Government	100	111·4	122·6	128·2	100	83·5	90·9	94·0
Wallpaper	100	134·8	128·1	126·8	100	121·1	113·3	117·2
Stone Quarrying	100	128·5	125·7	130·4	100	176·2	216·1	243·6
Entertainments, etc.	100	128·3	126·7	142·2	100	133·0	121·3	132·1
Industries and Services N.S.S.	100	128·4	125·0	122·6	100	98·0	103·3	85·6
Motor Vehicles, etc.	100	132·8	123·7	114·1	100	116·8	113·4	113·0
Shirts, Underclothing	100	125·4	123·7	125·2	100	193·7	198·8	199·8
Toys, Games, etc.	100	112·5	119·9	113·0	100	87·9	54·7	54·1
Brushes, etc.	100	113·4	119·2	110·3	100	154·9	144·0	138·2
Printing, Publishing	100	116·8	119·2	117·1	100	130·6	126·3	126·4
Musical Instruments	100	142·6	117·7	102·1	100	95·8	58·8	63·9
Building	100	120·6	115·9	112·3	100	119·8	102·6	95·9
Food Industries N.S.S.	100	119·1	117·8	116·8	100	174·5	161·1	170·6
Professional Services	100	113·5	117·1	121·1	100	116·9	117·3	124·1
Metal Industries N.S.S.	100	120·5	116·0	108·9	100	119·7	113·5	108·8
Rubber	100	119·7	115·1	106·6	100	110·2	107·9	97·6
Cement, etc.	100	123·1	113·0	97·9	100	65·2	182·6	39·1
Constructional Engineering	100	124·3	114·6	108·8	100	167·7	169·4	128·9
Iron and Steel Tubes	100	126·7	114·0	82·5	100	128·6	22·3	26·9
Fishing	100	113·6	112·5	116·9	100	100·5	119·3	108·7
Glass Bottles	100	118·4	111·3	113·5	100	186·3	134·1	178·2
Stove, Grate, etc.	100	114·6	109·0	99·1	100	108·8	97·2	83·5
Oilcloth, etc.	100	114·6	107·8	96·0	100	109·0	103·2	99·9
Hosiery	100	119·1	108·7	107·2	100	138·2	159·4	160·5
Total	100	128·2	128·2	129·9	100	128·7	125·7	127·4

* No allowance for exclusion of those over 65 years of age after January, 1928.

APPENDIX 4.

TABLE I.

*Census of Population, 1921.**England and Wales.**Percentage of Females to Males by Age-Group of Occupied Persons in (a) Cotton Carding, Spinning, Doubling; (b) Cotton Weaving; (c) All Industries.*

Age last Birthday. Years.	Percentage Females to Males.		
	Cotton Carding, Spinning, Doubling and Thread Mills.	Cotton Weaving.	All Industries.
14-15	144	210	68
16-17	177	261	79
18-19	206	306	83
20-24	237	312	76
25-34	151	240	41
35-44	83	165	27
45-54	52	94	23
55-59	40	66	23
60-64	35	57	23
65-69	29	42	24
Total (All occupied aged 14 years and over).	127	184	42

TABLE II.

Percentage Sex Distribution in Great Britain and Northern Ireland of the Insured Population in (a) Cotton and (b) All Industries, 1923-1930.

Year.	Cotton.	All Industries.
	Females as Percentage of Males.	Females as Percentage of Males.
1923	173·1	34·9
1924	179·1	35·8
1925	176·2	36·4
1926	174·9	36·2
1927	174·6	36·3
1928	179·8	37·8
1929	176·4	38·1
1930	186·8	38·9

From 1928 onwards persons over 65 were excluded from the insured population, but this change is not likely to invalidate the comparison seriously.

TABLE III.

*Census of Population, 1921.**Percentage Marital Distribution among (a) Female Textile Workers in "Lancashire and parts of Cheshire and Derbyshire" and (b) Total Occupied Females in England and Wales.*

	Single.	Married.	Widowed or Divorced.	Total
Lancashire Textile Workers.	67.0	28.1	4.9	100.0
All Occupations—England and Wales.	77.9	13.7	8.4	100.0

TABLE IV.

*Census of Population, 1921.**Percentage Distribution of Textile Workers (between different occupations) in Lancashire.*

	Males.	Females.
Employers and Managers	3.1	—*
Foremen and Overlookers	8.7	—
Spinners and Piecers (Mule, Ring, Cap, Flyer)	21.6	7.6
Breakers, Rag Grinders, Hecklers and Willowers	1.3	—
Card, Comb, and Frame Tenters (not ring, cap, or flyer frame). Box minders.	1.3	12.1
Strippers and Grinders; Card Grinders. Card Room Jobbers.	2.7	—
Doublers and Doubling Frame Tenters (not silk)	1.1	1.1
Weavers	23.0	48.9
Winders (not silk), Reelers, Warpings (not lace), Beamers	1.5	17.3
Drawers-in and Twisters-in... ..	2.1	—
Sizers, Slashers, Tapers	2.4	—
Lookers and Examiners; Burlers and Menders	1.7	—
Total	100.0	100.0

* Occupations with less than 1 per cent. of total are marked —.

TABLE V.

*Census of Population, 1921.**"Lancashire and parts of Cheshire and Derbyshire."**Numbers in "Weaving Occupations" shown under "Spinning" Industrial Group and numbers in "Spinning Occupations" shown under "Weaving" Industrial Group.*

Occupations.	In Spinning Industrial Group.		In Weaving Industrial Group.	
	Males.	Females.	Males.	Females.
<i>Weaving.</i>				
Weavers	87	745	41,096	155,774
Winders, Reelers, Beamers, Warpers.	1,026	26,887	1,628	31,036
<i>Spinning.</i>				
Spinners and Piecers	33,866	16,288	8,008	10,190
Breakers, Hecklers and Wil- lowers.	1,511	594	823	238
Card, Comb, and Frame Tenters	1,115	30,871	1,092	10,409
Strippers and Grinders. Card Room Jobbers.	3,503	449	1,551	317
Doublers	1,508	2,376	1,268	910

TABLE VI.

*Percentage Occupational Distribution of Unemployed Males in the Lancashire Cotton Industry.**

Date.	Card and Blowing Room.	Spinning.	Beaming, Warping, Winding.	Weaving.	Total.
1929—					
September 16th ...	9.4	49.0	12.3	29.3	100
December 16th ...	8.8	55.0	11.6	24.6	100
1930—					
January 20th ...	9.1	54.7	11.2	25.0	100
March 17th ...	8.8	53.3	9.7	28.2	100
June 23rd ...	9.8	49.4	10.1	30.8	100
September 15th ...	9.8	44.3	10.2	35.7	100
November 10th ...	8.2	46.9	10.0	34.9	100
1931—					
January 19th ...	8.8	50.6	9.8	30.7	100
March 16th ...	8.1	47.3	9.1	35.6	100
June 22nd ...	8.7	48.5	10.2	32.5	100
July 20th ...	8.7	48.3	9.9	33.1	100

* The figures up to November 10th, 1930, are not comparable with those for the later dates. The earlier group is based on information from 35 Employment Exchanges and excludes juveniles 16-18 years. The later group covers 66 Employment Exchanges and Branch Offices, and includes Juveniles.

TABLE VII.
*Percentage Occupational Distribution of Unemployed Females in the
 Lancashire Cotton Industry.**

Date.	Card and Blowing Room.	Spinning.	Beaming, Warping, Winding.	Weaving.	Total.
1929—					
September 16th ...	18·0	17·4	27·0	37·5	100
December 16th ...	22·0	18·8	28·1	31·1	100
1930—					
January 20th ...	21·6	18·6	28·2	31·7	100
March 17th ...	20·6	17·1	25·1	37·2	100
June 23rd ...	19·5	18·7	23·3	38·4	100
September 15th ...	17·8	14·9	19·0	48·3	100
November 10th ...	17·2	14·8	19·3	48·6	100
1931—					
January 19th ...	20·6	16·5	20·6	42·3	100
March 16th ...	19·5	15·7	20·7	44·1	100
June 22nd ...	18·9	15·9	21·5	43·7	100
July 20th ...	19·0	15·9	20·6	44·5	100

* See note to Table VI.

TABLE VIII.

*Percentage Sex Distribution of Persons Unemployed in Occupational Groups in the Lancashire Cotton Industry.**

Date:	Card and Blowing Room.			Spinning.			Beaming, Warping, Winding.			Weaving.			Total.		
	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.
1929—															
September 16th	15·8	84·2	100	50·3	49·7	100	14·1	85·9	100	22·0	78·0	100	26·5	73·5	100
December 16th	13·2	86·8	100	52·5	47·5	100	13·4	86·6	100	23·0	77·0	100	27·4	72·6	100
1930—															
January 20th ...	13·9	86·1	100	52·9	47·1	100	13·2	86·8	100	23·2	76·8	100	27·7	72·3	100
March 17th ...	14·8	85·2	100	55·8	44·2	100	13·6	86·4	100	23·6	76·4	100	28·9	71·1	100
June 23rd ...	18·1	81·9	100	53·9	46·1	100	16·1	83·9	100	26·2	73·8	100	30·7	69·3	100
September 15th	18·8	81·2	100	55·5	44·5	100	18·4	81·6	100	23·7	76·3	100	29·6	70·4	100
November 10th	15·9	84·1	100	55·8	44·2	100	17·1	82·9	100	22·2	77·8	100	28·5	71·5	100
1931—															
January 19th ...	15·5	84·5	100	57·0	43·0	100	17·0	83·0	100	23·8	76·2	100	30·1	69·9	100
March 16th ...	16·1	83·9	100	53·2	41·8	100	16·9	83·1	100	27·1	72·9	100	31·6	68·4	100
June 22nd ...	16·5	83·5	100	56·7	43·3	100	16·9	83·1	100	24·2	75·8	100	30·0	70·0	100
July 20th ...	15·9	84·1	100	55·7	44·3	100	16·6	83·4	100	23·6	76·4	100	29·3	70·7	100

* See note to Table VI.

TABLE IX.

Percentage Distribution between "Ordinary" and "Labouring" Occupations of Total Persons Unemployed in Cotton at 65 Employment Exchanges in the Cotton Areas.

1931.			Skilled.	Unskilled.	Total.
			Per cent.	Per cent.	Per cent.
27th July	...	...	94.0	6.0	100
24th August	...	...	94.0	6.0	100
21st September	...	...	93.8	6.2	100

TABLE X.

Percentage Distribution between "Ordinary" and "Labouring" Occupations of Persons Unemployed in various Cotton Occupations at 65 Employment Exchanges in the Cotton Areas.

MEN.

Date.	Card and Blowing Room.			Spinning, etc.			Beaming, Warping, Winding.			Weaving.		
	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1931—												
July 27th	66.0	34.0	100	86.7	13.3	100	80.8	19.2	100	93.8	6.2	100
August 24th	67.3	32.7	100	86.8	13.2	100	79.7	20.3	100	94.3	5.7	100
September 21st	65.9	34.1	100	84.8	15.2	100	79.3	20.7	100	93.9	6.1	100

TABLE XI.
Percentage Distribution between " Ordinary " and " Labouring " Occupations of Persons Unemployed in various Cotton Occupations at 65 Employment Exchanges in the Cotton Areas.

WOMEN.

Date.	Card and Blowing Room.			Spinning, etc.			Beaming, Warping, Winding.			Weaving.		
	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1931—												
July 27th ...	95.3	4.7	100	90.9	9.1	100	98.0	2.0	100	99.7	0.3	100
August 24th ...	94.8	5.2	100	89.9	10.1	100	98.0	2.0	100	99.7	0.3	100
September 21st ...	95.3	4.7	100	90.9	9.1	100	98.5	1.5	100	99.7	0.3	100

TABLE XII.
Percentage Distribution between " Ordinary " and " Labouring " Occupations of Persons Unemployed in various Cotton Occupations at 65 Employment Exchanges in the Cotton Areas.

MEN AND WOMEN.

Date.	Card and Blowing Room.			Spinning, etc.			Beaming, Warping, Winding.			Weaving.		
	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.	Skilled.	Unskilled.	Total.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1931—												
July 27th... ..	90.5	9.5	100	88.5	11.5	100	95.1	4.9	100	98.3	1.7	100
August 24th ...	90.4	9.6	100	88.1	11.9	100	94.9	5.1	100	98.5	1.5	100
September 21st ...	90.4	9.6	100	87.4	12.6	100	95.2	4.8	100	98.3	1.7	100

TABLE XIII.

Percentage Geographical Distribution of Insured Employed Persons in the Cotton Industry of the Survey Region. 1923, 1927, 1930.

<i>Groups of Employment Exchange Areas.*</i>	<i>1923.</i>	<i>1927.</i>	<i>1930.</i>
Blackburn, etc.	16.7	16.4	16.7
Burnley, etc... ..	13.4	13.2	13.2
Bury, etc.	10.4	10.4	9.8
Bacup, etc.	3.2	3.1	3.0
Preston, Chorley	8.2	8.0	7.6
Oldham, etc.	15.4	15.5	15.7
Bolton, etc.	11.7	12.4	13.1
Stalybridge, Hyde, etc.	10.7	10.4	9.4
Wigan, Atherton, etc.	3.5	3.6	3.8
Trafford Park, etc.	1.9	1.9	1.9
Manchester, etc.	4.4	4.7	5.3
Lancaster, Blackpool, etc....	0.4	0.3	0.4
Survey Region	100	100	100

* For the exact content of each group in terms of Employment Exchange Areas see map facing p. iv.

TABLE XIV.

Percentage Geographical Distribution of Insured Unemployed Persons in the Cotton Industry of the Survey Region. 1923, 1927, 1930.

<i>Groups of Employment Exchange Areas.*</i>	<i>1923.</i>	<i>1927.</i>	<i>1930.</i>
Blackburn, etc.	15.2	13.8	21.4
Burnley, etc.	11.5	9.2	12.1
Bury, etc.	12.0	9.6	8.8
Bacup, etc.	2.2	3.8	2.5
Preston, Chorley	6.2	6.6	7.2
Oldham, etc.	20.6	21.9	15.4
Bolton, etc.	6.7	7.3	10.7
Stalybridge, Hyde, etc.	13.5	13.7	11.8
Wigan, Atherton, etc.	5.3	6.0	4.3
Trafford Park, etc.	2.4	2.6	1.3
Manchester, etc.	4.2	5.3	4.3
Lancaster, Blackpool, etc....	0.2	0.3	0.2
Survey Region	100	100	100

* See note to Table XIII.

APPENDIX 5.

TABLE I.

Estimated Numbers of Cotton Spinning Spindles (000's omitted) at 31st January, 1931, on the basis of the returns made to the International Master Cotton Spinners' Federation.

Country.	Total Spinning Spindles.	Mule.	Ring.	(3) as a percentage of (1).	Percentages of spindles operating on high draft.
	(1).	(2).	(3).	(4).	(5).
Great Britain ...	54,933	41,693	13,240	24·0	Per cent. *
Germany ...	10,838	4,460	6,378	59·0	8·0
France ...	10,254	3,545	6,709	65·4	*
Italy ...	5,346	595	4,751	89·0	35·0
Belgium ...	2,154	430	1,724	80·0	4·0
Spain ...	2,070	431	1,639	79·0	29·0
Switzerland ...	1,387	576	811	58·5	*

The returns did not cover Japan and U.S.A., but the distribution of spindles in those countries has been estimated as follows:—

Japan ...	7,191	42	7,149	99·5	*
U.S.A. ...	33,345	1,094	32,251	96·7	*

* We have been unable to obtain complete statistics of high draft spindles for these countries. The percentage in Great Britain appears to be negligible.

TABLE II.

MILL A.

Comparative Particulars of a Mill formerly engaged on the production of 14's/16's twist and weft from Mules and now spinning the same quantity of 14's/16's twist on High Draft Rings.

Machines.	Old System : 122,928 mule spindles producing 180,000 lbs. of 14's/16's yarn per week on the Standard System.		New System : 64,400 high draft ring twist spindles producing 180,000 lbs. of yarn per week. High draft from Intermediate Bobbin.			
Cards ...	301	Draft. —	Hank. —	301	Draft. —	Hank. —
Draw Frames	15-2 heads of 8 dcls.	6	0.097	21-3 heads of 8 dcls.	6	0.12
Slubbers ...	15 × 96 spls.	4.4	0.43	21 × 96 spls.	4.25	0.51
Inters. ...	30 × 140 spls.	4.7	1.01	42 × 140 spls.	4.8	1.22
Rovers ...	60 × 180 spls.	4.5	2.25			
Mules ...	100	app. 7.0	14's/16's			
Rings ...				140 × 460 spls.	app. 12.5	14's/16's

LABOUR PARTICULARS.

Card Room—
20 Males. 115 Females.
Spinning Room—
150 Males.
Subsidiary—
10 Males. 5 Females.

Card Room—
20 Males. 83 Females.
Spinning Room—
4 Males. 122 Females.
Subsidiary—
10 Males. 1 Female.

SUMMARY OF LABOUR REQUIREMENTS.

<i>Old System.</i>					<i>New System.</i>				
Card Room and Spinning Room.					Card Room and Spinning Room.				
Men.	Women.	Youths.	Boys.	Girls.	Men.	Women.	Youths.	Boys.	Girls.
76	90	50	54	30	34	169	—	—	37
Total		300.			Total		240.		

It will be observed that the roving stage was cut out and the machines comprising the remaining stages (draw-frames, slubbers and intermediates) were slightly augmented in order to produce the same weight on a slightly finer hank. This meant that whereas 30 women and 25 girls were taken from the rovers, 6 women were appointed to the new draw-frames, 6 women to the new slubbers, and 6 women and 6 girls to the new intermediates, leaving a balance of 12 women and 19 girls to be absorbed in ring spinning. Of the males employed on mules before conversion, only 12 were taken into the ring room as ticketers, oilers and banders, etc.; 138 were permanently discharged; of these, 46 were men, and 92 youths and boys.

Taking the mill as a whole there was a reduction in the total volume of employed labour of 20 per cent., but whereas the demand for male labour was decreased by 81 per cent., the re-directed demand produced an increase of 71.5 per cent. of female labour.

TABLE III.

Comparative List of Machines, Labour, Power and Space Requirements, in a Medium Counts Mill spinning with Low Draft and with High Draft, with Single Roving and with Double Roving. The Mill contains 73,920 Ring Spindles and Preparation for a production of 73,920 lbs. of 36's per week of 48 Hours.

Machines.	No. 1. Ordinary Draft from 5 Hank Single Roving.			No. 2. Long Draft from 1·8 Hank Single Roving.			No. 3. Long Draft from 3·6 Hank Double Roving.			No. 4. Ordinary Draft from 7 Hank Double Roving.		
	No. of Machs.	Draft.	Hanks.	No. of Machs.	Draft.	Hanks.	No. of Machs.	Draft.	Hanks.	No. of Machs.	Draft.	Hanks.
Hopper Bale Breakers	3			3			3			3		
Hopper Openers	3			3			3			3		
Hopper Feeders	3			3			3			3		
Exhaust and Crighton Opener Com- binations	3			3			3			3		
Single Finisher Scutchers	8			8			8			8		
Roving Waste Openers	1			1			1			1		
Single Carding Engines 45 ins. × 50 ins.	144		0·14	144		0·14	144		0·12	144		0·1
Draw Frames 3 heads of 8 dcls. ...	12	6·0	0·144	12	6·0	0·144	9	6·0	0·12	14	6·0	0·1
Slubbing Frames each 100 spindles ...	12	5·0	0·72	12	5·0	0·72	9	4·5	0·54	14	5·0	0·8
Intermediate Frames each 144 spindles	24	5·0	1·8	24	5·0	1·8	16	5·0	1·35	28	5·5	2·3
Roving Frames each 184 spindles 8 in. lift, or	56	5·5	5·0	Roving	Stage	out out.	32	5·4	3·6			
Roving Frames each 200 spindles 7 in. lift.										84	6·0	7·0
Ring Spinning Frames each 480 spindles	154	7·1	36·0s	154	20·0	36·0s	154	20·0	36·0s	154	10·0	36·0
Total Number of Frames in Card room	104			48			66			140		

Approximate reduction in Frames in Card room	... ..	... ..	... ..	... ..	... ..	... ..	... ..	No. 2 over No. 1.	No. 3 over No. 4.
Approximate saving in Floor Space	... ..	... ..	... ..	... ..	... ..	... ..	... ..	53 per cent.	53 per cent.
	... ..	... ..	... ..	... ..	... ..	... ..	... ..	28 "	35 "

TABLE IV.

A comparative List of Machines in a Fine Spinning Mill with Ordinary Draft and after conversion to High Draft. The mill has 100,000 Ring Spindles and Preparation for a production of about 30,000 lbs. of average 80's carded and combed Yarns per week of 48 hours.

Machines.	Ordinary Draft from 13 hank Double Roving.			High Draft from 6 hank Double Roving.		
	No. of Machs.	Draft.	Hanks.	No. of Machs.	Draft.	Hanks.
Hopper Bale Breakers ...	1			1		
Hopper Openers ...	2			2		
Hopper Feeders ...	2			2		
Exhaust and Crighton Combinations.	2			2		
Single Finisher Scutchers	4			4		
Roving Waste Openers	1			1		
Single Carding Engines...	120		0.22	120		0.22
Sliver Lap Machines (20 cans).	10	2.5	0.025	10	2.5	0.025
Ribbon Lap Machines ...	10	6.0	0.025	10	6.0	0.025
Combers	56	45.0	0.17	56	45.0	0.17
Draw Frames 3 by 8 delts.	8	6.0	0.22	5	5.0	0.15
Slubbing Frames each 100 spls.	8	5.75	1.26	5	5.0	0.75
Intermediate Frames each 144 spls.	24	6.0	3.78	10	5.3	2.0
Roving Frames each 216 spls. 8 ins. lift or	68	7.0	13.0			
Roving Frames each 200 spls. 8 ins. lift.				28	6.0	6.0
Ring Spinning Frames each 500 spls.	200	12.3	80.0s	200	26.6	80.0s
Total No. of Frames in Card room	108			48		

Approximate reduction in Frames in Card room	55 per cent.
Approximate saving in Floor Space	34 "
Approximate saving in Workpeople (female) ...	56 "
Approximate saving in Power	62 "

TABLE V.

The following are estimates of the cost of winding and warping in a mill preparing 24,760 lbs. of 36's twist per week of 48 hours under five alternative systems. The estimates are framed to bring out the reactions of the different technical systems upon—

- The capital costs of conversion.
- Capital and labour charges per lb. of yarn.
- The volume of labour required for the given output.

No. 1 System,

Lancashire Slow Speed System (as in common use), Winders averaging 40 spindles each. Beamers doing own creeling.

Machinery and Labour.	Weekly Cost.	Total per Week.	Total Preparation Costs per lb. of yarn.
5 Winding Frames each } 360 Spindles. 11 Beaming Frames }	Depreciation, interest and upkeep at 9 per cent. per annum. £ s. d. 2 10 0		
<i>Labour.</i>			
<i>av.</i> 45 Winders at 33s. per week	75 0 0		
11 Beamers at 35s. "	19 0 0		
		£96 10 0	d. 0.935

*Labour Required: 45 Winders (women and girls).
11 Beamers (" ").*

*Output per Head: Winding 605 lbs. per week.
Beaming 2,251 lbs. "*

No. 2 System.

Machines as No. 1 System. Winders averaging 40 spindles per Winder, but Beamers each attending more than one frame, and receiving help for creeling.

Machinery and Labour.	Weekly Cost.	Total per Week.	Total Preparation Costs per lb. of yarn.
5 Winding Frames, each } 360 Spindles 14 Beaming Frames* }	Depreciation, interest and upkeep at 9 per cent. per annum. £ s. d. 2 15 0		
<i>Labour.</i>			
<i>av.</i> 45 Winders at 33s. per week	75 0 0		
2 Beamers with 4 machines } 2 " " 3 " } <i>av. 40s. per week.</i>	8 0 0		
3 Creelers at 20s. per week	3 0 0		
		£88 15 0	d. 0.86

*Labour Required: 45 Winders (women and girls).
4 Beamers (" ").
3 Creelers (girls).*

*Output per Head: Winding 605 lbs. per week.
Beaming 3,537 lbs. "*

* Reduced labour, also speed of frames reduced from 80 to 60 yds./min. More frames to maintain output.

No. 3 System.

High Speed System. High speed warping from bottle bobbins at 200-300 yards per minute. Winders, averaging 50 spindles per winder. Beamers, one operative per frame with help for creeling.

Machinery and Labour.	Weekly Cost.	Total per Week.	Total Preparation Costs per lb. of yarn.
6 Winding Frames, each 300 Spindles. Barber Knotters. 4 Beaming Frames, Magazine Creels.	Interest, depreciation and upkeep at 12 per cent. per annum*. £ s. d. 7 0 0		
<i>Labour.</i> av. 36 Winders at 35s. per week 4 Beamers at 40s. " 1 Creeler at 20s. "	63 0 0 8 0 0 1 0 0		
		£79 0 0	d. 0.77

Labour Required: 36 Winders (women and girls).
4 Beamers (" ").
1 Creeler (girl).

Output per Head: Winding 688 lbs. per week.
Beaming 4,952 lbs. " " "

* Increased allowance for interest, depreciation and upkeep over that allowed for Lancashire slow speed system because of shorter life, and more expensive upkeep of high speed beamers, and inclusion of Barber Knotters.

No. 4 System.

High Speed System. High speed warping from cones at 200-300 yds./min. Winders averaging 25 heads. Beamers, 2 frames per operative with help for creeling.

Machinery and Labour.	Weekly Cost.	Total per Week.	Total Preparation Costs per lb. of yarn.
7 Winding Frames, each 100 Spindles. Barber Knotters. 4 Beaming Frames, Magazine Creels.	Interest, depreciation and upkeep at 12 per cent. per annum. £ s. d. 12 14 0		
<i>Labour.</i> av. 28 Winders at 35s. per week 2 Beamers at 40s. " 2 Creelers at 20s. "	49 0 0 4 0 0 2 0 0		
		£67 14 0	d. 0.66

Labour Required: 28 Winders (women and girls).
2 Beamers (" ").
2 Creelers (girls).

Output per Head: Winding 884 lbs. per week.
Beaming 6,190 lbs. " "

No. 5 System.

The Barber and Colman System. Winding from roving built ring bobbins at up to 1,200 yds./min. High speed beaming from winders' cheeses at 200-300 yds./min.

Machinery and Labour.	Weekly Cost.	Total per Week.	Total Preparation Costs per lb. of yarn.
4 Winding Machines, each } 100 Spindles. 3 Beaming Frames. }	Depreciation, interest and upkeep at 12 per cent. per annum. £ s. d. 24 0 0		
<i>Labour.</i>			
8 Winders at 25s. per week.	10 0 0		
3 Beamers at 40s. "	6 0 0		
2 Creelers (male) at 50s. per week.	5 0 0		
1 Mechanic (male) at 80s. per week.	4 0 0		
		£49 0 0	d. 0.48

Labour Required: 8 Winders (girls).
1 Mechanic (man).
3 Beamers (women and girls).
2 Creelers (youths).

Output per Head: Winding 2,751 lbs. per week.
Beaming 4,952 " "

TABLE VI.

Mill A.—Four Looms System.

Data.—The mill contains 500 ordinary Lancashire looms, 40 ins. wide, and is run on the "room and power" system to produce a printing cloth (plain cloth) of the following particulars:—

36 ins. wide × 91.25 yds. 72/76 38's/38's.
5 per cent. contraction, warp and weft.

Loom Particulars.—Reed width, 37.75 ins.

38's ring yarn on loom beam.

38's mule weft in cop form (not reweave).

Wt. of twist yarn per cut. 7.67 lbs.

Wt. of selvage yarn per cut. 0.164 lbs. (18 ends 2/50's Egyptian each side).

Wt. of weft yarn per cut. 8.64 lbs. (Weft waste 5 per cent.).

Weaving price from Uniform List. 68's reed. 40 ins. loom—4s. 11½d. per piece.

Analysis of Production and Expenses.

Production per loom. (40 ins. loom, 210 picks/min. 80 per cent. efficiency).

$$\frac{210 \times 60 \times 48 \times 80}{74 \times 36 \times 100} = 182 \text{ yds. per loom per week.}^*$$

$$= 2 \text{ pieces per loom per week.}$$

Production of mill = 2 × 500 = 1,000 pieces per week.

* In order to bring the production per loom per week to round figures, the picks per inch have been changed from 76 to 74. As the same method is followed on the calculation on 8 looms, the comparison is not affected.

		£	
<i>Capital Cost.</i> —500 looms at £14 per loom =		7,000	
Stores and accessories at			
£2 10s. per loom =		1,250	
Total ...			£8,250
<i>Capital Charges.</i>			<i>Pence per cut.</i>
Interest, 5 per cent. per annum	}	10 per cent. on £8,250 ...	3·81
Deprecn. 3 " " "			
Repairs 2 " " "			
<i>Raw Material Cost.</i>			
38's ring beam at 11·25d./lb. + 0·75d./lb. for			
sizing 7·67 lbs. at 12·0d.		92·04	
38's weft (mule cop) 8·64 lbs. at 9·0d.		77·76	
2/50's Egyptian selvedge 0·164 lbs. at 15·0d.		2·46	
		<hr/>	
		172·26	
<i>Gain from sale of waste.</i>			
5 per cent. of 8·64 lbs. of weft 0·43 lbs. at 3·6d.		1·55	
		<hr/>	
Nett cost: Raw material		170·71	170·71
<i>Weaving Labour Cost.</i>			
Weaver's Wage (4s. 11½d. per piece)		59·50	59·50
			<i>Pence per cut.</i>
<i>Overhead Charges—Wages and Expenses.</i>			
Drawing and twisting (hand)		1·51	
Overlooking at 1s. 4d. per £1 of weavers' wages...		4·00	
Cloth looker, Warehousemen (1 Looker, 1 Bundler, 1 Labourer, 2 Boys).		1·90	
Office Staff (Manager, Salesman, Cashier, Boy) ...		3·78	
Room and Power		7·80	
		<hr/>	
		18·99	18·99
<i>Sundries.</i>			
<i>Healds and Reeds:—</i>			
Life of healds: 5 warps (75 pieces)		1·04	
Life of reeds: 2 years (200 pieces)		0·34	
Leather; pickers; shuttles		2·00	
Health and unemployment insurance		2·50	
Other insurance		0·50	
Bank interest on £5/loom at 5½ per cent. per annum		0·66	
Bad debts and allowances (estimated)		1·00	
Carriage; warp, weft and cloth (in and out) ...		2·06	
		<hr/>	
		10·10	10·10
			<hr/>
			263·11
<i>Cost Summary.</i>			
		<i>Pence per cut.</i>	<i>Per cent. of total cost.</i>
Capital charges		3·81	1·4
Raw material cost		170·71	64·9
Weaving labour cost		59·50	22·6
Overhead charges		29·09	11·1
		<hr/>	
		263·11	100·0

Mill A.—Eight Looms System.

The number of looms in the mill was increased from 500 to 537 on account of the lower loom speed on the new system, thereby obtaining the same production as before. The reduced speed of the looms was designed to facilitate the work of the weaver, and she was further assisted by the provision of larger "cops" and of subsidiary labour for sweeping, oiling, weft and cut-carrying and taking off pieces. The weaver's wage was based on the price list circulated by the Cotton Spinners and Manufacturers' Association, October 14th, 1930, which provides for payment on a "pick" basis. The rate for this cloth (76 ends per inch, 36 ins. wide) was 16·0d. per 100,000 picks plus a 10 per cent. addition for the width of the cloth, making 17·6d. per 100,000 picks.

The working particulars are as follows:—

- Loom speed, 185 picks/minute (11·9 per cent. reduction on 4 loom speed).
- Large Cops, lasting 8–10 minutes.
- Weft waste, 3 per cent.
- Wt. of twist yarn per cut, 7·67 lbs. (as before).
- Wt. of weft yarn per cut, 8·40 lbs.
- Wt. of selvedge yarn per cut, 0·164 lbs. (as before).

Analysis of Production and Expenses.

Production per loom. (40 ins. loom, 185 picks/min., 85 per cent. efficiency).

$$= \frac{185 \times 60 \times 48 \times 85}{74 \times 36 \times 100} = 170 \text{ yards/loom/week.}$$

Number of looms to give same production as before.

$$= \frac{91 \cdot 25 \times 1,000}{170} = 537 \text{ looms.}$$

	£	s.	d.
<i>Capital Cost.</i> 537 looms at £14 per loom =	7,518	0	0
Stores and Accessories at £2 10s. 0d.			
per loom ... ..	...	...	...
		1,342	10 0
Total	8,860	10	0

Capital Charges.

	Pence per cut.	
Interest 5 per cent. per annum	} 10 per cent. on £8,860·5	4·1 4·1
Depreciation 3 " "		
Repairs 2 " "		

Raw Material Cost.

38's ring beam at 11·25d./lb. + 0·75d./lb. for sizing	
7·67 lbs. at 12·0d. 	92·04
38's weft (mule cop) 8·4 lbs. at 9·0d. 	75·60
2/50's Egyptian selvedge 0·164 lbs. at 15·0d. 	2·46
	170·10

Gain from sale of waste.

3 per cent. of 8·4 lbs. of weft : 0·25 lbs. at 3·6d.	0·90	
	169·20	169·20

Weaving Labour Cost.

Weaver's Wage (3/8·35 per piece) 	44·35	44·35
--	-------	-------

Overhead Charges—Wages and Expenses.

Drawing and twisting (hand)	1.51	
Overlooking (£4/120 looms)	4.30	
Cloth looker, warehouseman (as before) (1 Looker, 1 Bundler, 1 Labourer, 2 Boys).	1.90	
Office Staff (as before) (Manager, Salesman, Cashier, Boy).	3.78	
Subsidiary labour at looms. (newly introduced)—		
2 weft carriers at 30s. per week		
4 sweepers at 30s. „		
1 piece carrier at 40s. „		
<hr/>		
Total £11 0s. 0d. per week.	2.63	
Room and power	8.35	
	<hr/>	
	22.47	22.47
<i>Sundries.</i>		
Healds and reeds	1.38	
Leather, pickers, shuttles	2.00	
Health and unemployment insurance (from 2.5 to 1.34).	1.34	
Other insurance (as before)	0.50	
Bank interest (as before)	0.66	
Bad debts and allowances (as before)	1.00	
Carriage; warp, weft and cloth (as before)	2.06	
	<hr/>	
	8.94	8.94
Total		249.06
		<hr/>

Cost Summary: Eight looms system.

	<i>Pence per cut.</i>	<i>Percentage of total cost.</i>
Capital Charges	4.10	1.6
Raw material cost	169.20	67.9
Weaving labour cost	44.35	17.9
Overhead charges	31.41	12.6
	<hr/>	<hr/>
Total	249.06	100.0

TABLE VII.

*Mill B.**Cloth: Burnley Printer.**Particulars: Standard Printer.**Comparative Costs of Production. Four and Eight Looms Systems.*

<i>Loom Particulars.</i>	<i>Four Looms per Weaver.</i>	<i>Eight Looms per Weaver.</i>
Speed	216	194
Efficiency (average)	85.3 per cent.	90.75 per cent.
Production per week per loom	167.5 yds.	160.5 yds.

Cost of Week's production.

<i>Raw material cost.</i>	<i>Pence.</i>	<i>Pence.</i>	<i>Pence.</i>	<i>Pence.</i>
Twist at 10d. lb.	167·5		160	
Weft at 10d. lb. (including waste) ...	175·87		166·4	
Regain from sale of waste at 5d. lb. (4 looms 5 per cent. ; 8 looms 4 per cent.).	4·18		3·2	
Nett cost : raw material ...		339·19		323·20
Weaving labour cost*		124·00		86·50
Overlooking (£4 10s. 0d. per 120 looms)		9·00		9·00
Carrying, sweeping, etc.		—		8·00
Health and unemployment insurance...		4·25		2·12
Expenses		49·85		49·85
Total cost of week's production. For 167·5 yds.		526·29d.	For 160·5 yds.	478·67d.
Cost per piece of 160·5 yds.		504·30d.		478·67d.

* Weaving cost : 4 looms system calculated on Uniform List ; 8 looms system calculated on New List.

TABLE VIII.

*Mill C.**Comparative Labour Costs of Production. Four and Eight Looms Systems.*

Cloth particulars: 35½ ins. 156 yards. 76/80. 34/40. 20% size. (plain weave).

Particulars for 9 weeks.

EIGHT LOOMS SYSTEM.

Speed.	Hours.	Yards woven.	Yards per loom.	Total picks.	Price per 100,000 picks.	Efficiency.	Wages.	Week ending.
180	48	1,290·91	161·36	3,718,400	17·5	Per cent. 89·67	£ s. d. 2 14 3	14/3
180	48	1,308·71	163·59	3,764,800	17·5	90·79	2 14 11	21/3
180	48	1,291·07	161·39	3,718,400	17·5	89·66	2 14 3	28/3/4
180	(*)39½	1,036·00	129·50	2,984,100	17·5	87·99	2 3 4	11/4/4
190	(*)35	982·32	122·70	2,829,300	17·5	89·81	2 1 3	18/4/4
190	48	1,282·96	160·37	3,695,200	17·5	89·84	2 13 10½	25/4/4
190	47½	1,240·34	155·04	3,573,300	17·5	82·48	2 12 1	2/5/4
190	48	1,327·67	165·96	3,823,800	17·5	87·34	2 15 9	9/5/4
190	48	1,294·03	161·75	3,736,900	17·5	85·36	2 14 6	16/5/4

(*) Holiday weeks.

The sweeping, oiling, cleaning, removal of cloth and cloth picking provided for productions above are weaving time only during the whole week.

FOUR LOOMS SYSTEM.

Average figures for 16 weeks run on four looms.

Total cloth produced in this period on four looms = 72 pieces of 156 yards.

Loom speed.	Hours per week.	Yards woven per week. 4 looms.	Yards per loom per week.	Actual picks per week per loom.	Possible picks per week per loom.	Efficiency.	Average wage per week for four looms.
210.	48	702	175.5	505,440	604,800	Per cent. 83.57	£ s. d. 2 1 6

The sweeping, oiling, cleaning, removal of cloth and cloth picking done by weaver.

Output per weaver comparison:

Average per week of 48 hours, eight looms: 1,293.6 yards.

" " " four looms: 702.0 yards.

Increase in output per weaver on introduction of eight looms system:

591.6 yards per week = 45.73 per cent.

Average weaving cost per yard woven: Eight looms system: 0.504d.

Four looms system: 0.709d.

Average saving in weaving labour cost per yard woven on introduction of eight looms system: 0.205d. = 29.1 per cent.

TABLE IX.

Output per Weaver on Four, Six and Eight Looms Systems.

An attempt is made here to measure the average percentage increase in the output per weaver consequent upon the introduction of the "more looms" system for a group of standard "bulk trade" cloths. The cloths shown are by no means all those which are in constant demand but are some of those upon which the Lancashire industry has been built, and, moreover, are, to our knowledge, being woven at present on "more looms" systems. For convenience of comparison we have set out the loom speeds together with the average efficiencies, both on the old and new systems. Loom efficiencies we have found to vary in accordance with many factors between different mills weaving the same cloths, and even from weaver to weaver in the same mill. Unless a pick-counter is attached to the loom the efficiency cannot be measured with any degree of accuracy, and as few pick-counters are to be found in Lancashire we have had to depend on the figures given to us by the mills visited. Many of these figures have been used in the table appended, whilst others are the average of those supplied. In general, we have found about a 5 per cent. increase in loom efficiency after the introduction of a "more looms" system, and consequently, where we have had no reliable figure at hand for purposes of the table, we have assumed that increase. The loom speeds are, also, in the main, those we have actually found, although some are the average of those found. In this respect it should be noted that several of the mills concerned had increased their loom speeds after the weavers had become accustomed to the new system.

Style.	Coarse Cloth Particulars.	Loom Speed.		Loom Efficiency.		Output per weaver per week of 48 hours.				Medium Cloth and Fine Cloth Particulars.	Loom Speeds.		Loom Efficiency.		Output per weaver per week of 48 hours.			
		4 loom system	6 loom system	4 loom system	6 loom system	4 loom system.		6 loom system.			4 loom system	8 loom system	4 loom system	8 loom system	4 loom system.		8 loom system.	
						Lin. yds.	Sq. yds.	Lin. yds.	Sq. yds.						Lin. yds.	Sq. yds.	Lin. yds.	Sq. yds.
		per cent.	per cent.								per cent.	per cent.						
Printers Bleachers.										29½ ins. 125½ yds. 60/62 36/42	220	185	85	90	1,150	940	2,030	1,670
Shirtings ...										36 ins. 82½ yds. 76/82 80/80	220	185	80	85	688	688	1,230	1,230
										38 ins. 38 yds. 18/16 80/30	220	185	78	80	856	905	1,480	1,560
										30½ ins. 35 yds. 61/64 22/30	230	195	78	80	900	764	1,560	1,320
Drillettes ...	29½ ins. 80 yds. 82/60 11/10	220	195	70	75	985	810	1,400	1,150	40½ ins. 64 yds. 120/76 36/42	220	185	80	85	740	833	1,330	1,500
Drills ...	85 ins. 116 yds. 17/12 18/18	215	190	75	80	1,070	1,040	1,520	1,480									
Double Warp Twill										32 ins. 80 yds. 50/100 2/40/20	230	195	85	90	525	550	1,125	1,000
Baft ...										26½ ins. 27 yds. 64/64 18/24	235	200	80	85	940	690	1,700	1,250
Pocketing	31 ins. 50 yds. 16/17 2/30/2/30	225	200	80	85	847	780	1,200	1,035									
Sateens ...										31 ins. 90 yds. 19/25 38/36	220	185	85	90	600	517	1,065	918
										41 ins. 185 yds. 19/19 36/34	210	180	82	85	725	825	1,290	1,470
										56 ins. 90 yds. 21/30 36/30	195	165	75	82	390	608	725	1,130
Twills, Jeans										38 ins. 116 yds. 64/96 32/18	225	190	78	80	586	620	1,030	1,090
										41 ins. 68 yds. 19/19 36/42	220	185	80	85	733	835	1,330	1,530
Warp Satins.										29½ ins. 90½ yds. 154/76 70/90	220	185	86	90	765	627	1,400	1,150
										28½ ins. 90½ yds. 140/72 50/60	225	190	80	85	800	633	1,430	1,130

Style.	Coarse Cloth Particulars.	Loom Speed.		Loom Efficiency.		Output per weaver per week of 48 hours.				Medium Cloth and Fine Cloth Particulars.	Loom Speed.		Loom Efficiency.		Output per weaver per week of 48 hours.			
		4 loom system	6 loom system	4 loom system	6 loom system	4 loom system.		6 loom system.			4 loom system	8 loom system	4 loom system	8 loom system	4 loom system.		8 loom system.	
						Lin. yds.	Sq. yds.	Lin. yds.	Sq. yds.						Lin. yds.	Sq. yds.	Lin. yds.	Sq. yds.
Pongees ...				per cent.	per cent.					39 ins. 80½ yds. 80/18 60/80	210	180	85	90	795	862	1,440	1,560
Wincoyettes	88 ins. 120 yds. 60/70 24/16	230	195	72	75	780	800	1,000	1,056									
Jaconettes										42 ins. 25½ yds. 54/90 42/54	220	185	80	85	665	776	1,120	1,310
Lawns Cambrics ...										43 ins. 2/23½ yds. 20/20 44/54	215	182	79	83	680	812	1,210	1,450
										36 ins. 16 yds. 78/60 60/60	220	185	80	85	940	940	1,680	1,680
										42 ins. 58 yds. 74/74 38/44	215	182	82	85	765	893	1,340	1,565
Mook Volles										40 ins. 120 yds. 60/56 50/50	210	190	86	90	1,030	1,140	1,950	2,170
Volles ...										40 ins. 120 yds. 58/54 2/100/2/100	200	185	80	85	950	1,058	1,875	2,080
Brocades* Casements										50 ins. 120 yds. 60/60 36/18	170	160	78	80	705	930	1,385	1,900
Java's ...										49 ins. sp. 118 yds. 74/62 38/36	180	160	75	80	700	955	1,320	2,080
Rayon Woft.										34 ins. 120 yds. 58/48 50/150D	182	165	70	80	850	803	1,760	1,665

* Relatively few "more looms" systems are as yet producing these cloths. There are good grounds, however, for believing that an expansion will follow in the near future.

Several important facts emerge from the table above. In the first place, it is noticeable that the output per weaver varies widely on the four loom organisation. The variation is caused primarily by the wide differences in the number of "picks per inch" in the cloths dealt with and differences in loom speed and loom efficiencies. Also, whilst square yardage produced for any cloth is a function of the linear yardage, it should be borne in mind that for the same cloth the linear production figure slows down as the loom width increases, the speed of the loom being governed by its width. Variations may appear through differences in loom staffing arrangements in different mills. For example, in two mills weaving the same cloth, other things being equal, output per head will be lower in the mill which has the greater number of "learners" on two or three looms. Again, under-employment of weavers (i.e., employment on less than four looms) is more common at some mills than at others.

An inspection of the six and eight looms output per weaver figures shows that the "more looms" system would create still more widely varying figures from mill to mill and cloth to cloth, for whereas much of the coarse trade cannot be catered for with more than six looms per operative, many of the "finer picked" cloths can be woven on a ten looms system. Nevertheless, an examination of the average percentage increases in output per head is important.

Average Percentage "Output per Weaver" Increases.

					<i>Per cent.</i>
Average increase	6 looms over	4 looms:	linear	yardage	... 40
"	"	6	"	4 " square "	... 40
"	"	8	"	4 " linear "	... 84
"	"	8	"	4 " square "	... 84

As an example for ten looms, take the case* of a plain cloth of the following particulars: 29½ ins., 125½ yds., 60/52, 36/42, ring twist, mule left. The figures are:

					<i>Per cent.</i>
Increase	10 looms over	4 looms:	linear	and square	... 122
"	10	"	8	"	... 25

In interpreting these figures in relation to the possible future demand for weaving labour, certain reservations must be borne in mind:

1. It is essential to note that whilst the cloths instanced are typical of those going to form Lancashire's bulk trade, there is no possibility of arriving at even an approximate assessment of the degree in which they may be regarded as typical. There are a host of other "standard" cloths and hundreds of "hybrids" which may now be regarded as included in the bulk trade, for during the past few years the demand for standard cloths has been so fluctuating that many concerns have been modifying their looms in order to weave speciality cloths. These manufactures, deviating from standard cloths, affect output per head taking the industry as a whole.

2. The figures take no account of the many cloths which are in constant demand but which, because of their width or complex structure, cannot be woven on "more looms" systems. The proportion of these cloths in manufacture in Lancashire, whilst not capable of assessment, is certainly of some consequence and would effectively insulate a large body of weavers from the unemployment effects of the "more looms" systems.

* This cloth is being woven in Lancashire on a 10-loom system with the provision of warp stop motions and subsidiary labour. Four loom speed, 220. Efficiency, 85 per cent. Ten loom speed, 185. Efficiency, 90 per cent.

APPENDIX 6.

TABLE I.

Output of Coal in Lancashire and Cheshire and its Relation to Output in Other Fields. 1875-1930.

Average of Years.	Annual Output Lancashire and Cheshire.	Percentage of Col. (b) to Average Annual Output in "Competitive Fields"*	Percentage of Col. (b) to Average Annual Output in Great Britain.†
(a)	000 tons. (b)	000 tons. (c)	(d)
1876-80	18,826	42·8	13·8
1881-85	20,617	40·7	13·0
1886-90	21,943	40·4	12·9
1891-95	21,914	38·4	12·0
1896-1900	24,524	36·8	11·7
1901-05	24,558	33·9	10·7
1906-10	24,816	28·8	9·5
1911-15	23,249	25·2	8·7
1916-20	20,512	23·7	8·6
1922-25†	18,786	19·3	7·3
1927-30†	15,710	16·6	6·3

* The "competitive" coalfields have been taken as: Yorkshire; Derby, Nottingham and Leicester; Stafford, Salop; Worcester and Warwick.

† The years 1921 and 1926 have been omitted because of the prolonged stoppages in those years.

‡ Including particulars for Ireland up to the year 1921.

TABLE II.

Annual Average Output per Person Employed in a Number of Coalfields in Great Britain. 1875-1930.
(Tons.)

Annual Average.*	Lancashire and Cheshire.	Yorks.	Derby.	Notts.	Leicester.	Great Britain.
1876-80	302	266	263	295	228	292
1881-85	315	300	308	338	264	324
1886-90	314	281	302	337	260	315
1891-95	252†	250	260	291	231	271
1896-1900	289	276	309	311	269	292
1901-05	262	259	279	291	263	276
1906-10	250	267	311	307	278	273
1911-15	222‡	256‡	293	294	286‡	251
1916-20	167§	—	258	268	—	220
1922-25|| ... ..	180	240	247	223	249	223
1927-30|| ... ..	193	254	252	264	255	258

* Simple average of average annual output per head in each of the years in the period.

† Includes only 1891, 2 and 3.

§ Includes only 1919 and 20.

‡ Includes only 1911, 12, 13 and 14.

|| See note † to previous table.

TABLE III.

Output per Man-Shift Worked in Lancashire, Cheshire and North Staffs. and other Coalmining Areas.

(Cwts.)

Quarter ended Dec. 31st.	Lancashire, Cheshire and N. Staffs.	Yorkshire.	Notts and N. Derby.	S. Derby, Leicester, Cannock Chase, Warwick.	Great Britain.
1921 ...	14·46	19·98			17·73
1922 ...	14·79	20·59			18·10
1923 ...	14·89	20·28			17·76
1924 ...	14·42	20·04			17·74
1925 ...	15·06	20·42			18·31
1927* ...	15·97	21·84	22·92	19·40	20·47
1928 ...	17·57	23·21	24·42	21·06	21·80
1929 ...	17·73	23·71	24·41	21·43	21·78
1930* ...	17·12	23·28	24·23	20·95	21·34

* 3rd quarter.

TABLE IV.

Annual Average Total Costs of Production (including wages) per Ton of Coal Disposable Commercially in Certain Coalmining Areas.

Quarter ended Dec. 31st.	Lancashire, Cheshire and N. Staffordshire.	1927 =100.	COMPETITIVE FIELDS.						Great Britain.	1927 =100.
			Yorkshire.	1927 =100.	N. Derby and Notts.	1927 =100.	S. Derbyshire, Leicester, Cannock Chase and Warwick.	1927 =100.		
1921	s. d. 25 7½	142·5	s. d. 22 11½						s. d. 22 8½	152·7
1922	19 4½	107·6	15 3½						16 11½	114·1
1923	18 3½	101·6	15 9						17 11½	120·6
1924	21 1½	117·5	16 8						18 4½	123·4
1925*	20 3	112·6	15 9½						17 5½	117·2
1927	17 11½	100	s. d. 14 5½	100	14 1½	100	s. d. 15 9½	100	14 10½	100
1928	17 1	95·0	13 5½	93·2	13 0½	92·3	14 6	91·8	13 8½	92·3
1929	16 4½	91·1	12 8½	88·0	12 9½	90·6	14 2½	89·8	13 3½	89·5
1930	16 5½	91·5	12 9½	88·6	12 6½	88·5	13 10½	87·7	13 7½	91·6

* Including subvention.

TABLE V.

*Balance between Proceeds and Costs per Ton of Coal Disposable Commercially
in certain Coalmining Areas.*

	Lancashire, Cheshire and North Staffs.	Yorkshire.	North Derbyshire and Notts.	South Derbyshire, Leicester, etc.	Great Britain.
<i>1921.</i>	s. d.	s. d.	s. d.	s. d.	s. d.
4th Qtr. ...	+ 1 4		+ 1 9		+ 3½
<i>1922.</i>					
1st Qtr. ...	+ 1 5½		+ 1 8		+ 1 1½
2nd „ ...	— 8½		— 3½		— 0½
3rd „ ...	— 9		+ 1 7½		+ 1 1
4th „ ...	+ 0½		+ 2 1½		+ 1 6½
<i>1923.</i>					
1st Qtr. ...	+ 11		+ 2 7½		+ 1 5½
2nd „ ...	+ 9		+ 2 8½		+ 3 2½
3rd „ ...	— 10½		+ 1 3½		+ 1 0½
4th „ ...	+ 1 3½		+ 2 9½		+ 1 11½
<i>1924.</i>					
1st Qtr. ...	+ 2 6½		+ 2 9½		+ 2 9½
2nd „ ...	+ 6		+ 1 8½		+ 1 0½
3rd „ ...	— 1 0½		+ 10½		+ 0½
4th „ ...	+ 0½		+ 2 0		+ 7½
<i>1925.</i>					
1st Qtr. ...	+ 8		+ 1 7½		+ 6
2nd „ ...	— 1 2½		— 3½		— 11½
<i>1927.</i>					
1st Qtr. ...	+ 1 6½	+ 2 0½	+ 2 4½	+ 5 1½	+ 1 2½
2nd „ ...	— 1 4½	— 3½	— 1 10½	— 1 4½	— 1 0½
3rd „ ...	— 1 7½	— 7½	— 1 3½	— 6½	— 1 2
4th „ ...	— 1 0½	— 10½	— 7½	— 7	— 1 0½
<i>1928.</i>					
1st Qtr. ...	— 10½	— 6½	— 5½	— 0½	— 0 9½
2nd „ ...	— 2 0½	— 1 9	— 1 4½	— 1 2½	— 1 5
3rd „ ...	— 2 7½	— 1 4	— 9½	— 8½	— 1 4½
4th „ ...	— 5½	— 2	+ 5½	+ 9½	— 0 3
<i>1929.</i>					
1st Qtr. ...	+ 9½	+ 1 0½	+ 1 6½	+ 2 9½	+ 9½
2nd „ ...	— 11	— 2	— 6½	— 4	— 3½
3rd „ ...	— 1 2	+ 1½	+ 3	+ 5½	— 0½
4th „ ...	+ 7½	+ 1 3½	+ 1 2½	+ 1 6	+ 11½
<i>1930.</i>					
1st Qtr. ...	+ 1 1½	+ 1 7½	+ 1 6½	+ 1 11½	+ 1 1½
2nd „ ...	— 10½	— 0½	— 5	— 3	— 2
3rd „ ...	— 1 3½	— 2½	— 1½	+ 4½	— 2½
4th „ ...	— 7	+ 10½	+ 1 2½	+ 1 6	+ 6½

TABLE VI.

*Average Proceeds * per Ton of Coal Disposable Commercially in Lancashire and Cheshire and other Coalfields.*

Quarter ended Dec. 31st.	Lancashire, Cheshire and N. Staffs.	Yorkshire.	N. Derby and Notts.	S. Derby, Leicester and Warwick etc.	Great Britain.
	s. d.		s. d.		s. d.
1921 ...	27 1½		24 8½		23 0
1922 ...	19 4½		17 5½		18 6½
1923 ...	19 7		18 6½		19 10½
1924 ...	21 2½		18 8		19 0
1925 ...	19 3½		15 11½		15 11½
	s. d.	s. d.	s. d.	s. d.	
1927 ...	16 11½	13 6½	13 6½	15 2½	13 10
1928 ...	16 7½	13 3½	13 6½	15 3½	13 5½
1929 ...	17 0	14 0	14 0¼	15 8¼	14 3
1930 ...	17 0½	13 7½	13 8½	15 4¼	14 1½

* Proceeds after deduction of selling and delivery expenses.

TABLE VII.

Net Selling Value per Ton of Coal Raised in Lancashire and Cheshire and other Coalfields.

Year.	Lancashire and Cheshire.	Yorkshire, S.	Yorkshire, W.	Notts.	Derby, N.	Derby, S.	Staffs., N.	England and Wales.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1921 ...	28 11·32	26 2·86	27 0·11	25 8·85	26 3·41	26 5·31	23 2·18	26 5·92
1922 ...	19 5·30	17 4·49	18 5·74	16 8·66	17 2·35	16 11·80	19 1·11	17 11·95
1923 ...	18 3·38	17 8·34	18 1·43	16 11·78	16 9·44	15 2·70	18 0·98	18 10·48
1924 ...	19 10·65	18 1·13	18 8·46	17 11·12	17 8·42	17 2·85	19 7·26	19 0·77
1925 ...	19 0·50	15 7·82	16 11·03	15 2·49	15 5·59	15 2·80	19 2·58	16 8·45
1928 ...	15 7·20	12 4·86	13 6·07	12 2·13	12 5·35	12 4·02	15 3·75	13 0·94
1929 ...	15 11·71	13 0·51	14 0·00	12 7·94	12 11·48	12 10·08	15 7·26	13 7·77
1930 ...	15 11·38	12 11·67	13 11·41	12 7·15	12 11·57	12 8·13	15 5·57	13 9·96

TABLE VIII.

Average Weekly Tonnage of Coal Raised in "Lancashire, Cheshire and North Wales" and Other Coalmining Areas.*

	* Lancashire, Cheshire and N. Wales.	Percentage of Col. (a) to Total for Competitive Fields.†	Percentage of Col. (a) to Total for Great Britain.
	(a)	(b)	(c)
1928	357,960	20·4	7·7
1929	371,423	19·9	7·4
1930	358,029	19·7	7·5
1931.			
1st Quarter ...	376,400	20·2	8·2
2nd " ...	329,792	20·5	7·8
3rd " ...	299,885	18·9	7·6

* North Wales, in 1930, had an output of 22 per cent. of that of Lancashire and Cheshire.

† Yorkshire; Derby, Notts. and Leicester; Stafford, Salop, Worcester, Warwick.

TABLE IX.

Number of Collieries at Work in Lancashire and Cheshire.

1900	466	1925	234
1913	412	1926	247
1921	286	1928	217
1922	267	1929	210
1923	253	1930	198
1924	242		

APPENDIX 7.

TRADE BOARD WAGE RATES IN CERTAIN CLOTHING TRADES.
Ready Made Wholesale Bespoke Tailoring Trade.

FEMALE LEARNERS.

	Learners Commencing at			
	14 and under 15 years of age.		15 and under 16 years of age.	
	Column I.		Column II.	
	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.
During 1st six months of employment	s. d.	d.	s. d.	d.
" 2nd " " " "	6 6	1½	8 0	2
" 3rd " " " "	8 0	2	9 0	2½
" 4th " " " "	11 0	2½	12 0	3
" 5th " " " "	12 0	3	17 0	4½
" 6th " " " "	16 0	4	20 0	5
" 7th " " " "	18 0	4½	25 0†	6½†
" 8th " " " "	22 0	5½	—	—
" 8th " " " "	25 0†	6½†	—	—
	16 and under 18 years of age.*		18 and under 21 years of age.	
	Column III.		Column IV.	
	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.
During 1st six months of employment	s. d.	d.	s. d.	d.
" 2nd " " " "	9 0	2½	12 0	3
" 3rd " " " "	12 0	3	17 0	4½
" 4th " " " "	16 0	4	20 0	5
" 4th " " " "	18 0†	4½†	25 0†	6½†
	21 years of age and over.			
	Column V.			
	Per week of 48 Hours.		Per Hour.	
During 1st three months of employment	s. d.	d.	s. d.	d.
" 2nd " " " "	...	...	13 0	3½
" 3rd " " " "	...	...	17 0	4½
" 4th " " " "	...	...	22 0	5½
" 4th " " " "	...	...	25 0	6½

* Notwithstanding the provisions of sub-paragraph (1) of the Proviso to this Paragraph, learners commencing at 16 and under 18 years of age shall, on attaining the age of 18 years, be entitled during the remainder of their learnership period to receive 5s. per week of 48 hours, i.e. 1½d. per hour in addition to the General Minimum Time Rate applicable, as set out in Column II above.

† These minimum rates shall continue to be payable until the learner ceases to be a Learner under the Provisions of sub-Paragraph (2) of the Proviso to this Paragraph.

Provided that:

(1) The advances to be given to learners commencing at under 21 years of age shall become due as from the first Monday in January and July of each year, the Learner being entitled to her first advance on the first Monday in January or July as the case may be, provided that she has been in the trade at least three months.

(2) A learner shall cease to be a learner and be entitled to the full General Minimum Time-Rate applicable to her under Paragraph 1 or 2 upon the fulfilment of the conditions appropriate to her as set out below:—

<i>Age upon Entering Employment.</i>	<i>Conditions.</i>
Under 15 years	The completion of not less than three years' employment and the attainment of the age of 18 years.
15 and under 16 years of age...	The completion of not less than two years' employment and the attainment of the age of 18 years.
16 and under 21 years of age...	The completion of two years' employment.
21 years and over	The completion of one year's employment.

(3) No female learner shall be held to be entitled to the full General Minimum Rate under Paragraph 1 or 2 until she has attained the age of 18 years, notwithstanding any employment she may have had.

(4) In determining the age of entry and length of employment, all service prior to the age of 14 shall be disregarded.

Shirtmaking Trade.

A Female Learner is a Worker who:—

(a) Is employed during the whole or substantial part of her time in learning any branch or process of the trade by an employer who provides the learner with reasonable facilities for such learning; and

(b) Has received a certificate or has been registered in accordance with rules from time to time laid down by the Trade Board, or has made application for such certificate or registration which has been duly acknowledged and is still under consideration.

Provided that the certificate or registration of a Learner may be cancelled if other conditions of Learnership are not complied with.

Provided that an employer may employ a Female Learner on her first employment, in a branch or branches of the trade specified in Part V of this Schedule, without a certificate or registration for a probation period not exceeding four weeks, but the probation period shall be included in her period of Learnership.

Provided that, notwithstanding compliance with the conditions contained in this Section, a person shall not be deemed to be a Learner if she works in a room used for dwelling purposes and is not in the employment of her parent or guardian.

Shirtmaking Trade.
FEMALE LEARNERS.

	Learners commencing at			
	14 and under 15 years of age.		15 and under 16 years of age.	
	Column I.		Column II.	
	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.
During 1st six months of employment after the age of 14.	s. d. 6 6	d. 1½	s. d. 8 0	d. 2
Do. 2nd Do. Do.	8 0	2	9 0	2½
Do. 3rd Do. Do.	11 0	2½	12 0	3
Do. 4th Do. Do.	12 0	3	17 0	4½
Do. 5th Do. Do.	16 0	4	20 0	5
Do. 6th Do. Do.	18 0	4½	25 0†	6¼†
Do. 7th Do. Do.	22 0	5½	—	—
Do. 8th Do. Do.	25 0	6¼	—	—
	16 and under 18 years of age.*		18 and under 21 years of age.	
	Column III.		Column IV.	
	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.
	s. d.	d.	s. d.	d.
During 1st six months of employment	9 0	2½	12 0	3
2nd " " " "	12 0	3	17 0	4½
3rd " " " "	16 0	4	20 0	5
4th " " " "	18 0	4½	25 0	6¼
	21 years of age or over.			
	Column V.			
	Per week of 48 Hours.		Per Hour.	
	s. d.	d.	s. d.	d.
During 1st three months of employment	...	...	13 0	3½
2nd " " " "	...	...	17 0	4¼
3rd " " " "	...	...	22 0	5½
4th " " " "	...	...	25 0	6¼

* Notwithstanding the provisions of Sub-section (1) of the Proviso to this section a Learner commencing at 16 and under 18 years of age shall, on attaining the age of 18 years, be entitled during the remainder of her learnership period to receive 5s. per week of 48 hours, i.e., 1½d. per hour in addition to the General Minimum Time Rate applicable as set out in Column III above.

† These minimum rates shall continue to be payable until the Learner ceases to be a Learner under the provisions of Sub-section (2) of the Proviso of this section

Dressmaking and Women's Light Clothing Trade.

LEARNERS.

	Area A.*		Area B.*		Area C.*	
	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.	Per week of 48 Hours.	Per Hour.
During 1st year of employment in the Retail Bespoke Dressmaking Branch of the Trade.	s. d. 5 0†	d. 1½	s. d. 6 0†	d. 1½	s. d. 6 0	d. 1½
Do. 2nd Do. Do.	9 0	2¼	12 0†	3	12 0	3
Do. 3rd Do. Do.	14 0	3½	18 0†	4½	18 0	4½
Do. 4th Do. Do.	20 0	5	25 0†	6¼	25 0	6¼

Note. If the conditions of learnership specified in Section II of Part I of Schedule III (W.D.(20)) are not complied with, the minimum rate applicable is that set out in section II of this part of the Schedule.

* For definitions of Areas, see Section IV of Part I of this Schedule.

† These Minimum Rates are effective as from 10th April, 1922.

DEFINITIONS, CONDITIONS, AND PROVISIONS GOVERNING THE APPLICATION OF THE MINIMUM RATES OF WAGES EFFECTIVE IN THE TRADE UNDER THE TRADE BOARDS ACT.

PART I.

Definitions.

For the Purpose of the Application of the Minimum Rates of Wages Fixed by the Trade Board.

Section I.—The Retail Bespoke Dressmaking branch of the trade is that branch of the Dressmaking and Women's Light Clothing trade specified in the regulation made by the Minister of Labour dated 24th November, 1919 (as varied by the Trade Boards (Shirtmaking) Order 1920) and as set out in Part IV of this schedule, in which the employer supplies the garment direct to the individual wearer and employs the worker direct.

Section II.—A Female Learner is a worker who:—

(a) Is employed by an employer who provides her with reasonable facilities for practically and efficiently learning one of the branches of the Trade, or the various processes involved in the making of any of the articles specified in the definition of the Trade set out in Part IV of this schedule; and

(b) Has received a certificate or has been registered in accordance with rules from time to time laid down by the Trade Board, or has made application for such certificate or registration which has been duly acknowledged and is still under consideration. Provided that the certification or registration of a Learner may be cancelled if the other conditions of learnership are not complied with.

Provided that an employer may employ a Female Learner on her first employment without a certificate or registration for a probation period not exceeding four weeks, but in the event of such a learner being continued thereafter at her employment, the probation period shall be included in her period of learnership.

Section III.—A Home worker is a worker who works in her own home or in any place not under the control or management of the employer.

PART II.

Provisions relating to the Minimum Rates of Wages for Female Learners.

(1) The advances to be given to a learner shall become due on the completion of each 12 months of employment in (a) the Retail Bespoke Dressmaking branch of the trade or (b) any branch of the trade other than the Retail Bespoke Dressmaking branch.

(2) A learner shall cease to be a learner and be entitled to the General Minimum Time Rate applicable to workers other than learners on the completion of 4 years of employment in (a) the Retail Bespoke Dressmaking branch of the trade or (b) any branch of the trade other than the Retail Bespoke Dressmaking branch.

(3) For the purpose of the minimum rates for female learners and the provisions relating thereto, a worker who has had employment in the Retail Bespoke Dressmaking branch of the trade shall be entitled to count half the period of such employment as employment in any branch of the trade other than the Retail Bespoke Dressmaking branch and a worker who has had employment in any branch of the trade other than the Retail Bespoke Dressmaking branch shall be entitled to count half the period of such employment as employment in the Retail Bespoke Dressmaking branch.

Hats, Caps, and Millinery Trade.

<i>Female Learners.</i>	<i>Per Hour.</i>	<i>Per Week of 48 Hours.</i>	
		<i>d.</i>	<i>s. d.</i>
During 1st year of employment	1½	6	0
„ 2nd „ „ „ „ „ „ „ „ „ „	3	12	0
„ 3rd „ „ „ „ „ „ „ „ „ „	4½	18	0
„ 4th „ „ „ „ „ „ „ „ „ „	6½	25	0

The General Minimum Time Rates for Learners set out in Paragraph (8) are subject to the following conditions:—

(a) The advances shall become due on the completion of each 12 months' employment in the trade.

(b) A learner shall cease to be a learner and be entitled to the full General Minimum Time Rate applicable to female workers other than learner upon completion of 4 years' employment in the trade.

(c) If the conditions set out in Paragraph (21) of this Schedule are not complied with, the General Minimum Time Rate applicable is that for female workers other than learners set out in Paragraph (7).

(d) A female worker who enters or who has entered the trade for the first time at 18 years of age or over shall be deemed, for the purpose of the application of Minimum Rates of Wages fixed by the Trade Board, and the calculation of the period of learnership, to have completed one year's employment as a learner.

Paragraph 21.

A female learner is a worker who:—

(a) is employed during the whole or a substantial part of her time in learning any branch or process of the trade specified in Paragraph 22 of this Schedule by an employer who provides the learner with reasonable facilities for such learning, and

(b) has received a certificate in accordance with rules from time to time laid down by the Trade Board, and held subject to compliance with conditions specified in this section, or has made application for such certificate which has been duly acknowledged and is still under consideration. Provided that the certification of a learner may be cancelled if the other conditions of learnership are not complied with.

Provided that an employer may employ a female learner on her first employment without a certificate for a probation period not exceeding four weeks, but in the event of such a learner being continued thereafter at her employment the probation period shall be included in her period of learnership.

APPENDIX 8.

TABLE I.

Lancashire and parts of Cheshire and Derbyshire.
Numbers of Occupied Persons in Various Branches of Distribution, 1921.

Type of Dealing.	Males.	Females.	Total.	
			Numbers.	Percentage of Total.
Grocery and Provisions—				
Wholesale	5,914	2,204	8,118	2·8
Retail	20,562	12,760	33,322	11·5
Departmental Stores, General Stores, etc.	20,543	12,011	32,554	11·2
Textiles and Clothing (wholesale)	24,910	6,295	31,205	10·7
Drapery, Hosiery, etc. (retail) ...	9,664	19,905	29,569	10·2
General and Export Trading Non-Textile Packing.	16,994	5,491	22,485	7·7
Meat (retail)	12,203	2,339	14,542	5·0
Coal	11,373	651	12,024	4·1
Vegetables (wholesale)	3,772	466	4,238	1·5
„ (retail)	6,489	4,342	10,831	3·7
Books, Newspapers, etc. (retail) ...	4,092	3,216	7,308	2·5
Metals, Tools (wholesale)	5,165	1,129	6,294	2·2
„ „ (retail)	3,809	1,653	5,462	1·9
Milk and Dairy Products (retail)	4,009	1,670	5,679	2·0
Sugar Confectionery (retail) ...	1,358	4,537	5,895	2·0
Furniture	4,436	1,409	5,845	2·0
Drugs, etc. (retail)	3,726	1,695	5,421	1·9
Boots and Shoes (retail)	2,686	2,370	5,056	1·7
Drysaltery, oils, etc. (wholesale) ...	3,838	847	4,685	1·6
Fish and Poultry (retail)	3,122	1,175	4,297	1·5
Tobacco (retail)	1,468	1,969	3,437	1·2
Grain and Forage	3,008	489	3,497	1·2
Others	20,979	8,064	29,043	9·9
Total	194,120	96,687	290,807	100·0

TABLE II.
Survey Region.
Estimated Number of Persons Insured, Unemployed and Employed in Distribution, 1923-31.

Year.	Number of Persons Insured.					Unemployed*					Number of Persons Employed.				
	Men.	Boys.	Women	Girls.	Total.	Men.	Boys.	Women	Girls.	Total.	Men.	Boys.	Women	Girls.	Total.
1923 ...	67,990	7,620	33,780	4,870	114,260	4,499	241	1,928	146	6,814	63,491	7,379	31,852	4,724	107,446
1924 ...	68,920	8,880	35,700	5,900	119,400	4,564	199	2,542	140	7,445	64,356	8,681	33,158	5,760	111,955
1927 ...	80,170	8,750	44,010	5,720	138,650	4,830	163	2,112	134	7,239	75,340	8,587	41,898	5,586	131,411
1929 ...	82,970	9,010	45,710	6,340	144,030	6,584	266	2,998	177	10,025	76,386	8,744	42,712	6,163	134,005
1930 ...	86,580	10,400	48,210	6,620	151,810	10,987	499	6,040	302	17,828	75,593	9,901	42,170	6,318	133,982
1931 ...	93,030	10,570	51,260	7,430	162,290	14,587	720	7,896	369	23,572	78,443	9,850	43,364	7,061	138,718

* For 1923 average taken for June, September and December. For 1924, 27, 29 and 30 average taken for March, June, September and December. For 1931, average of March, June, September. No allowance for exclusion of those over 65 years of age in 1929, 30, 31.

TABLE III.

Survey Region.

Index of Numbers of Insured Employed Persons in Distributive Trades
in each Sub-Area.*

Sub-Area.	1923.	1924.	1927.	1929.	1930.
Blackburn, Darwen, Accrington, etc.	100	115·1	115·6	132·0	123·0
Bacup, Rawtenstall, etc. ...	100	101·1	105·4	113·6	115·1
Oldham, Mossley, etc. ...	100	118·9	150·0	156·4	161·7
Bury, Littleborough, etc. ...	100	104·3	138·6	135·2	132·8
Stalybridge, Hyde, Stockport, etc.	100	110·1	137·4	143·8	141·8
Bolton, Leigh, etc. ...	100	109·0	121·5	125·0	123·4
Atherton, Wigan, etc. ...	100	106·2	126·9	134·4	136·1
St. Helens, Runcorn, etc. ...	100	106·7	134·1	141·1	146·4
Chorley, Preston ...	100	124·5	189·9	154·4	167·8
Trafford Park, Salford, etc. ...	100	104·7	139·2	147·5	142·2
Lancaster, Fleetwood, etc. ...	100	116·3	143·4	150·6	157·0
Burnley, Nelson, Colne ...	100	113·5	145·2	154·3	146·9
Manchester, Denton, etc. ...	100	98·6	109·8	110·5	110·8

* See notes to Table II.

TABLE IV.

Survey Region.

Percentage Distribution of Insured Employed Persons in Distributive
Trades between Different Sub-Areas, 1930.

Sub-Area.	Percentage.	Sub-Area.	Percentage.
Blackburn, Darwen, etc. ...	4·8	St. Helens, Runcorn, etc. ...	5·3
Bacup, Rawtenstall, etc. ...	0·7	Chorley, Preston ...	3·8
Oldham, Mossley, etc. ...	3·6	Trafford Park, etc. ...	7·0
Bury, Littleborough, etc. ...	3·9	Lancaster, etc. ...	5·8
Stalybridge, Hyde, etc. ...	5·5	Burnley, Colne, Nelson ...	3·0
Bolton, Leigh, etc. ...	5·4	Manchester, Denton, etc. ...	48·0
Atherton, Wigan, etc. ...	3·2		
		Total ...	100·0

TABLE V.

Survey Region.

Percentage Distribution of Insured Employed Persons by Sex and Age.

Year.	Men. per cent.	Boys. per cent.	Women. per cent.	Girls. per cent.	Total. per cent.
1923 ...	59·1	6·9	29·6	4·4	100
1930 ...	56·4	7·4	31·5	4·7	100

TABLE VI.

Survey Region.

Percentage Unemployment among Insured Persons in the Distributive Trades.
1923-31.

Year.	Men. per cent.	Boys. per cent.	Women. per cent.	Girls. per cent.	Total. per cent.
1923 ...	6·6	3·2	5·7	3·0	6·0
1924 ...	6·6	2·2	7·1	2·4	6·2
1927 ...	6·0	1·9	4·8	2·3	5·2
1929 ...	7·9	3·0	6·6	2·8	7·0
1930 ...	12·7	4·8	12·5	4·6	11·7
1931 ...	15·7	6·8	15·4	5·0	14·5

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TABLE VII.

Numbers and Percentages of New Entrants and of Wastage in Distributive Trades in the N.W. Division. 1923-30.

Year.	Males.				Females.				Total.			
	New Entrants (July to June).		Wastage.		New Entrants (July to June).		Wastage.		New Entrants (July to June).		Wastage.	
	Numbers	Per- centage of Insured Males.	Numbers.	Per- centage of Insured Males.	Numbers.	Per- centage of Insured Females.	Numbers.	Per- centage of Insured Females.	Numbers.	Per- centage of Total Insured.	Numbers.	Per- centage of Total Insured.
1923-4 ...	14,678	11·8	13,408	10·8	11,501	16·1	5,761	8·1	26,179	13·4	19,169	9·8
1924-5 ...	15,574	12·4	4,034	3·2	12,609	16·3	6,559	8·5	28,183	13·9	10,593	5·2
1925-6 ...	13,175	9·6	6,495	4·7	11,833	14·2	9,723	11·7	25,008	11·3	16,218	7·4
1926-7 ...	13,507	9·4	9,397	6·5	12,480	14·6	11,670	13·7	25,987	11·3	21,067	9·2
1927-8 ...	12,865	8·7	12,985	8·8	11,370	13·2	6,390	7·4	24,235	10·3	19,375	8·3
1928-9 ...	13,626	9·2	5,486	3·7	11,468	12·6	8,098	8·9	25,094	10·5	13,584	5·7
1929-30 ...	14,114	9·0	824	0·5	11,656	12·3	3,476	3·7	25,770	10·3	4,300	1·7

APPENDIX 9A.

Electricity Supply.

TABLE I.*

Number of Staff and Workmen Employed by Authorised Undertakers in Great Britain.†

Year.	Local Authorities.				Companies.				All Authorised Undertakers.			
	Genera- tion.	Distribu- tion.	Adminis- tration.	Total.	Genera- tion.	Distribu- tion.	Adminis- tration.	Total.	Genera- tion.	Distribu- tion.	Adminis- tration.	Total.
1922-23 ...	11,050	9,449	3,361	23,860	5,280	4,977	2,242	12,499	16,330	14,426	5,603	36,359
1923-24 ...	—	—	—	—	—	—	—	—	—	—	—	—
1924-25 ...	11,580	11,384	3,899	26,863	5,788	5,977	2,764	14,529	17,368	17,361	6,663	41,392
1925-26 ...	11,634	13,387	4,151	29,172	6,172	6,845	3,095	16,112	17,806	20,232	7,246	45,284
1926-27 ...	11,824	14,567	4,388	30,779	6,483	8,124	3,317	17,924	18,307	22,691	7,705	48,703
1927-28 ...	12,166	16,245	4,799	33,210	6,603	8,472	3,580	18,655	18,769	24,717	8,379	51,865
1928-29 ...	12,138	19,649	5,122	36,909	6,208	9,536	4,088	19,832	18,346	29,185	9,210	56,741
1929-30 ...	12,401	21,355	5,569	39,325	6,342	11,381	4,572	22,295	18,743	32,736	10,141	61,620

Source :—Annual Return of Engineering and Financial Statistics. Electricity Commission.

* Information is not available for the years prior to 1922-23, or for the year 1923-24. The year of return is almost invariably April 1st to March 31st for Local Authorities, and the calendar year for Companies,

† See p. 237.

TABLE II.

*Growth of Sales of Units of Electricity for Different Purposes in Great Britain and in the Survey Region, 1920-21 to 1929-30.**

(1920-21 = 100.)

Year.	Lighting and Domestic Sales.		Public Lighting Sales.		Traction Sales.		Power Sales.		Total Sales to Consumers.		
	Great Britain.	Survey Region.	Great Britain.	Survey Region.	Great Britain.	Survey Region.	Great Britain.	Survey Region.	Great Britain.	Survey Region.	
1920-21	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1921-22	104.3	106.9	104.5	127.5	95.3	98.8	84.2	87.0	88.9	91.1	91.1
1922-23	122.1	128.0	124.3	160.3	102.3	104.1	102.0	111.2	107.1	112.0	112.0
1923-24	153.2	157.2	143.5	216.1	110.6	109.8	123.6	131.6	127.2	131.2	131.2
1924-25	178.3	181.9	166.1	277.2	118.5	114.8	141.3	152.5	145.1	150.2	150.2
1925-26	213.8	224.4	184.7	357.0	135.8	121.6	150.5	168.5	159.6	167.7	167.7
1926-27	247.9	268.9	198.3	398.4	148.9	121.1	150.8	169.7	167.1	173.3	173.3
1927-28	293.4	320.2	235.3	510.0	170.7	131.6	181.6	195.7	199.4	199.9	199.9
1928-29	349.7	377.2	263.1	578.1	188.3	131.5	197.1	206.4	222.1	213.9	213.9
1929-30	402.6	415.7	296.5	627.6	204.2	132.0	216.4	221.2	246.7	229.0	229.0

* See p. 241.

TABLE III.

*Sales of Electricity to Consumers for Different Purposes in Each Year 1920-21 to 1929-30 in the Survey Region expressed as a percentage of the corresponding sales in Great Britain.**

Year.	Lighting and Domestic Sales.	Public Lighting Sales.	Traction Sales.	Power Sales.	Total Sales to Consumers.
	Percentage.	Percentage.	Percentage.	Percentage.	Percentage.
1920-21 ...	9·7	6·3	23·5	16·4	15·8
1921-22 ...	10·0	7·7	24·4	16·9	16·3
1922-23 ...	10·2	8·2	24·0	17·8	16·6
1923-24 ...	10·0	9·5	23·4	17·4	16·4
1924-25 ...	9·9	10·5	22·8	17·7	16·4
1925-26 ...	10·2	12·2	21·1	18·3	16·7
1926-27 ...	10·5	12·7	19·1	18·4	16·5
1927-28 ...	10·6	13·7	18·1	17·6	15·9
1928-29 ...	10·8	13·9	16·4	17·1	15·3
1929-30 ...	10·0	13·4	15·2	16·7	14·7

* See page 241.

TABLE IV.

*Indices showing the relative importance of sales of Electricity in units for lighting and domestic purposes and sales for power purposes in Great Britain and the Survey Region respectively in each year 1920-21 to 1929-30.**

Year.	Sales for lighting and domestic purposes expressed as a percentage of total sales to consumers.		Sales for power purposes expressed as a percentage of total sales to consumers.		Sales for lighting and domestic purposes expressed as a percentage of sales for power purposes.	
	Great Britain.	Survey Region.	Great Britain.	Survey Region.	Great Britain.	Survey Region.
1920-21 ...	16·6	10·2	71·2	73·4	23·3	13·8
1921-22 ...	19·4	11·9	67·4	70·1	28·8	17·0
1922-23 ...	18·9	11·6	67·7	72·8	27·9	15·9
1923-24 ...	20·0	12·2	69·1	73·6	28·9	16·5
1924-25 ...	20·4	12·3	69·3	74·5	29·4	16·5
1925-26 ...	22·2	13·6	67·1	73·7	33·1	18·4
1926-27 ...	24·6	15·8	64·2	71·8	38·3	21·9
1927-28 ...	24·4	16·3	64·8	71·8	37·6	22·7
1928-29 ...	26·1	17·9	63·2	70·8	41·3	25·3
1929-30 ...	27·0	18·4	62·4	70·9	43·3	26·1

* See page 241.

TABLE V.

Trend of average revenue per unit obtained by authorised undertakers for Electricity sold to consumers in Great Britain and the Survey Region respectively.

1921-22 to 1929-30.*

(1921-22 = 100.)

Year.	Lighting and Domestic Sales.		Power Sales.		Total Sales to Consumers.	
	Great Britain.	Survey Region.	Great Britain.	Survey Region.	Great Britain.	Survey Region.
1921-22 ...	100.0	100.0	100.0	100.0	100.0	100.0
1922-23 ...	92.2	92.2	76.9	75.7	83.5	82.7
1923-24 ...	78.6	88.1	67.5	74.3	75.0	75.0
1924-25 ...	73.0	79.8	63.3	68.4	70.6	69.7
1925-26 ...	66.4	71.2	59.2	61.8	66.5	61.1
1926-27 ...	61.7	65.8	67.5	75.0	71.0	68.3
1927-28 ...	59.0	60.7	55.6	58.1	62.5	58.2
1928-29 ...	53.0	55.6	50.9	55.1	58.1	55.8
1929-30 ...	49.7	52.4	48.5	53.7	55.6	54.3

* See p. 245.

TABLE VI.

*Average revenue per unit obtained by authorised undertakers in the Survey Region for Electricity sold to consumers for different purposes, expressed as a percentage of the corresponding average revenue per unit obtained in Great Britain, in each year 1921-22 to 1929-30.**

Year.	Lighting and Domestic Sales.	Power Sales.	Total Sales to Consumers.
	Percentage.	Percentage.	Percentage.
1921-22 ...	88.9	80.5	83.9
1922-23 ...	88.9	79.2	83.1
1923-24 ...	99.6	88.6	83.9
1924-25 ...	97.1	86.9	82.9
1925-26 ...	95.3	84.0	77.0
1926-27 ...	94.6	89.5	80.7
1927-28 ...	91.4	84.0	78.1
1928-29 ...	93.1	87.2	80.6
1929-30 ...	93.7	89.0	81.9

* See p. 245.

TABLE VII.

Lighting and Domestic Supplies. Year 1929-30.

<i>Name of Undertaker.</i>	<i>Average Revenue per unit sold (in pence).</i>
Urban Electric Supply Co. (Glossop Undertaking)	7.60
Alderley Edge and Wilmslow Electricity Board	6.64
Ashton-in-Makerfield U.D.C.	5.68
Preesall U.D.C.	5.03
Horwich U.D.C.	4.96
Newton-in-Makerfield U.D.C.	4.59
Rochdale Corporation	1.86
Milnrow U.D.C.	2.08
Sale U.D.C.	2.18
British Insulated Cables Ltd. (Prescot Undertaking) ...	2.19
Salford Corporation	2.28
Accrington Corporation	2.32
Blackburn Corporation (C.B.)	4.38
Blackpool Corporation (C.B.)	2.32
Bolton Corporation (C.B.)	2.76
Burnley Corporation (C.B.)	2.78
Bury Corporation (C.B.)	2.86
Manchester Corporation (C.B.)	2.72
Oldham Corporation (C.B.)	3.62
Preston Corporation (C.B.)	2.40
Rochdale Corporation (C.B.)	1.86
St. Helens Corporation (C.B.)	2.95
Salford Corporation (C.B.)... ..	2.28
Stockport Corporation (C.B.)	2.96
Warrington Corporation (C.B.)	2.89
Wigan Corporation (C.B.)	3.15
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The Survey Region as a Whole	2.68

Power Supplies. Year 1929-30.

Urban Electric Supply Co. (Glossop Undertaking)	3.88*
Alderley Edge and Wilmslow Electricity Board	2.89
Padiham U.D.C.	2.38
Hindley U.D.C.	2.20
Preesall U.D.C.	2.10
Turton U.D.C.	1.91
Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board	0.55
Oldham Corporation... ..	0.59
Stretford and District Electricity Board	0.60
Mersey Power Co., Ltd.	0.62*
Lancashire Electric Power Company	0.67
Atherton U.D.C.	0.69
Blackburn Corporation	1.04
Blackpool Corporation	1.48
Bolton Corporation	0.74
Burnley Corporation	1.11
Bury Corporation	0.74
Manchester Corporation	0.76
Oldham Corporation	0.59
Preston Corporation	0.85
Rochdale Corporation	0.70
St. Helens Corporation	0.69
Salford Corporation	0.72
Stockport Corporation	0.73
Warrington Corporation	0.93
Wigan Corporation	0.93
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The Survey Region as a Whole	0.73

* Includes Heating and/or Cooking Supplies.

APPENDIX 9B.

*Notes on Private Generation of Electricity in the areas of four Authorised Undertakers in the Survey Region.**

1. *Manchester Corporation.*—In the area of the Manchester undertaking, the extent of private generation of electricity is very small in comparison with the aggregate public generation. The competition of steam is much more important than that of privately generated electricity.†

2. *Bury Corporation.*—Owing to the low price of electric power offered by the public undertaking in this area, private generation of electricity is uncommon, the most important instances of private plant occurring in the paper industry.

3. *Burnley Corporation.*—In this area, private generation is confined to a very small number of firms. The two leading examples are a colliery undertaking and a cotton weaving establishment. The former produces electricity for one of its collieries in the district, and in one year actually sold a quantity of electrical energy to the public undertaking: but at another of its collieries, it purchases power from the public supply for pumping, winding, etc. The cotton weaving firm uses its electricity for power and lighting purposes, and enjoys the further advantage that the steam used in the generation of electricity can be employed at a lower pressure for heating and important process work—the kind of advantage which accrues in many other industries to firms which generate their own electricity.

4. *Nelson Corporation.*—No more than two firms of any size—and those cotton weaving firms—have their own generators. One of these finds, however, that it is profitable to take power from the public supply for a section of its work which is engaged upon a special process requiring a very steady and regular drive.

* See p. 249.

† See p 366.

APPENDIX 9C.

*Notes on the consumption of public electric power in industry in the Survey Region.**

Several authorised undertakings were able to provide statistics showing the amount of electric power sold to each important industry in their areas over a number of years. Others gave an industrial classification of the electric motors connected to their supply either for one year or a number of years.

1. *Manchester Corporation.*—Table I gives an analysis of the power sales of the Manchester Corporation undertaking in each of the years from 1923–24 to 1930–31, based on an industrial classification of its consumers.

TABLE I.

Consumers' Classification.	Millions of Kilowatt-hours. Years ended March 31st.							
	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Engineering	51·1	57·1	59·0	57·1	62·0	64·6	69·6	61·9
Textiles	27·8	32·3	33·9	34·2	39·8	37·2	36·4	30·0
Chemicals	22·2	23·4	24·6	23·3	28·6	31·1	33·9	31·4
Sundry Industrial ...	31·0	33·5	40·8	43·7	47·5	51·6	55·2	60·2
Total industrial power	132·1	146·3	158·3	158·3	177·9	184·5	195·1	183·5
Total sales to consumers.	222·2	257·3	300·4	323·5	353·5	375·2	392·9	377·7

Sales to the engineering industry rose from 51·1 million units in 1923–24 to 69·6 millions in 1929–30, and then fell to 61·9 millions in 1930–31. The chemical industry took about 50 per cent. more in 1929–30 than in 1923–24, but then suffered a decline in 1930–31. The demands of the textile trades increased by 40 per cent. between 1923–24 and 1927–28, but slumped very badly in 1928–29 and 1929–30 and again in 1930–31 when they reached a level only 8 per cent. higher than the 1923–24 level. It will be seen that the rapid and unchequered growth of the "Sundry Industrial" total—from 31 million units in 1923–24 to 60·2 millions in 1930–31—materially contributed to the increase in the total power sales in this period, and was not interrupted even in 1930–31. It has been ascertained that the decline in power sales in 1930–31 shows itself in the sales to large users (i.e., those users who take high-tension power supplies by special contract containing a fuel clause), whereas a considerable increase in the number of ordinary small users has produced a slight net increase in the aggregate sales to this class.†

It will be noted that sales to three industries,—engineering, textiles, and chemical—accounted for 67 per cent. of the total power sales of this undertaking in the year 1930–31.

2. *Lancashire Electric Power Company.*—A rather more detailed classification of units sold to industry has been made by the Lancashire Electric Power Company. Table II sets out the total units sold by this undertaking to each of nine groups of industrial consumers in each of the years from 1921 to 1930.

* See p. 250.

† Industrial power sales of the Manchester Corporation undertaking in 1929–30 and 1930–31:—Large users (fuel clause) took 157·5 million units in 1929–30 and 145·3 in 1930–31. Small users took 38·9 million units in 1929–30 and 40·0 in 1930–31. The capacity of electric motors connected to the Corporation's supply has fallen from 193,690 kw. in 1929–30 to 188,226 kw. in 1930–31. See below, p. 365, for a further reference to the position of this undertaking in 1930–31.

TABLE II.

THE LANCASHIRE ELECTRIC POWER COMPANY.

*Classification of Units Sold, 1921-1930.**(In millions of Units.)*

Class. Year ended 31st December.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	1930.
Spinners, Weavers, etc.	13·6	21·9	22·8	26·8	30·3	29·1	33·3	34·6	32·1	26·3
Artificial Silk Manufacturers	—	—	—	0·4	1·3	1·6	3·3	5·9	7·0	8·5
Bleachers, Dyers, etc.	3·3	5·0	5·7	7·1	8·0	7·9	8·6	8·5	8·2	7·5
Collieries	10·8	12·7	13·5	15·8	14·2	11·2	15·1	14·6	14·2	15·4
Engineers	2·1	2·7	2·1	2·7	5·9	6·4	8·5	9·1	9·0	8·1
Paper Manufacturers	4·5	6·0	6·9	7·6	7·1	7·0	5·6	7·0	8·2	7·6
Chemical Manufacturers	0·1	0·1	0·1	0·2	0·6	2·2	3·3	4·8	6·0	5·8
Electro-Chemical Works	2·4	2·7	3·3	4·3	5·6	5·6	6·3	6·9	7·8	6·7
Rubber Manufacturers	—	—	—	—	—	5·2	8·9	10·7	13·3	13·2
Miscellaneous	1·7	1·1	1·8	1·9	2·1	2·1	1·9	1·8	2·1	2·4
Sales to Industries	38·5	52·2	56·2	66·8	75·1	78·3	94·8	103·9	107·9	101·5
Totals (including Bulk Supplies and Provisional Orders).	50·0	76·2	88·7	110·7	130·6	146·5	175·4	206·6	226·6	220·6

The increase in the sales of this Company between 1921 and 1930 was due in roughly equal parts to the growth of sales to the nine industrial groups mentioned and the increase in bulk supplies given to other authorised undertakings. Sales to industries increased by almost 200 per cent. in the period 1921-1929, the steady progress being maintained even in the year 1926. But 1930 saw a slight decline from the level reached in the previous year.

It will be observed that the classification of industrial consumers into nine groups is almost exhaustive. The "miscellaneous" group does not include any large consumer. Each group has contributed substantially to the aggregate growth of consumption in the ten years, but the largest absolute increases have been registered by textile spinning and weaving, rubber, artificial silk and engineering. Artificial silk and rubber, in spite of their late start, have quickly become prominent, while the growth of sales to chemical manufacturers has gathered speed since 1925. In 1930, textile spinning and weaving, coal and rubber accounted for 26 per cent., 15 per cent. and 13 per cent. respectively, of the total units sold to industries.

The magnitude of the demand of spinning and weaving is surprising in view of the fact that the Company's area of supply does not include any of the big cotton centres but is confined to a number of smaller towns and villages lying on the fringe of the cotton areas. Increased sales to collieries have been achieved in face of the competition of much private electric generating plant installed at or near the pithead. A notable feature of this Company's system is that the firms supplied in several of the industries are widely scattered over a large area of supply and are connected with one or other of three power stations situated at Kearsley, Padiham and Radcliffe.

3. *Stretford and District Electricity Board.*—The analysis of units sold for power purposes in Table III has been supplied by the Stretford and District Electricity Board. The figures for the years 1924 to 1929 relate to the Stretford Urban District Council Undertaking, those for the years 1930 and 1931 to the undertaking of the Board itself.*

The Board's area of supply includes the greater part, if not the whole, of the Trafford Park industrial area,† and the rapid increases in its sales to industry may be ascribed partly to the laying down of new plants in that area since the War and partly to the growth in capacity of existing establishments. The range of industries and trades in Trafford Park is unusually wide, and most of them are relatively "new" industries which prefer electric power to any other form of power.

The total power load of the Undertaking has increased from 16.9 million units in 1920-21 to 62.8 million units in 1930-31, and the exceedingly rapid progress has only been interrupted in two years 1921-22 and 1926-27. Only a small part of the large increase in the total in 1929-30 was due to the accession of the Barton and Urmston Electricity Board's load to that of the Stretford U.D.C. Undertaking.‡

* The Board acquired the Undertakings of the Barton and Urmston Electricity Board and the Stretford Urban District Council as from 31st March, 1929.

† The Board's area of supply is the Urban Districts of Stretford and Urmston, and the parishes of Davyhulme, Barton Moss and Flixton in the Rural District of Barton-upon-Irwell.

‡ Between 19th May, 1928, and 31st March, 1929, the Barton and Urmston Electricity Board sold only 0.02 million units for power purposes.

TABLE III.

STRETFORD AND DISTRICT ELECTRICITY BOARD.

Analysis of Units sold for Power Purposes in each year from 1923-24 to 1930-31.

Trade.	Year ending March 31st.							
	1923-4.	1924-5.	1925-6.	1926-7.	1927-8.	1928-9.	1929-30.	1930-1.
Food Products	222,197	338,010	306,952	434,261	510,762	558,281	670,745	874,633
Rubber	419,279	569,930	1,002,266	806,618	908,424	969,251	615,530	436,727
Flour Milling	4,378,051	4,404,184	3,905,552	3,484,704	3,763,879	4,175,013	4,211,793	4,424,446
Steel	370,770	6,257,544	5,069,700	3,310,400	6,012,550	4,608,450	5,287,400	5,832,170
Asbestos	938,430	1,177,920	1,388,520	1,804,425	1,794,415	2,072,900	1,901,800	2,416,800
Bottles	873,200	2,311,158	1,413,529	8,011	2,416	—	—	—
Cable	1,988,332	2,429,648	2,738,716	2,690,140	2,805,880	3,132,824	3,352,007	2,881,952
Wire	2,422,676	2,010,301	1,869,343	2,885,874	1,741,416	2,272,488	2,770,770	2,734,791
Warehouses	883,359	891,964	1,175,272	1,409,014	1,341,992	1,291,119	1,317,815	1,447,806
Chemicals	1,365,487	1,283,197	1,799,277	3,248,629	3,450,534	2,461,236	4,059,933	3,239,474
Oil	87,980	101,211	226,434	191,202	241,631	322,221	2,245,168	3,952,380
Constructional Engineering	1,341,256	1,378,252	1,095,970	1,362,168	1,768,768	1,764,879	1,682,362	1,358,629
General Engineering	991,217	1,089,112	1,100,394	636,595	943,670	1,036,664	1,094,660	898,700
Electrical Engineering	6,446,936	9,155,553	15,607,552	15,413,523	19,356,166	19,358,855	21,623,958	21,208,692
Motor Engineering	4,080,764	3,412,922	3,739,103	2,970,654	1,733,574	2,593,320	5,307,220	7,271,104
Timber	81,864	86,505	101,279	102,869	106,554	101,433	101,419	94,746
Miscellaneous	5,044,996	394,335	2,019,467	2,213,944	2,258,584	3,890,846	4,160,062	3,898,855
Total	31,936,794	37,291,746	44,559,326	42,973,031	48,741,215	50,609,780	60,402,642	62,971,905

The trend of development of the aggregate load is the resultant of widely different trends in the several industries which contribute to it. Between 1923-24 and 1929-30, consumption increased considerably in electrical, constructional and motor engineering, oil (since 1929), steel, asbestos, cables, and chemicals. On the other hand, sales to bottle making totally disappeared in 1923-29, and consumption showed little change between 1923-24 and 1929-30 in flour milling, general engineering and wire making. In the intervening years, there were substantial fluctuations in the demands expressed by several trades, such as rubber, steel and motor and general engineering.

The continued growth of the total load in the year ending 31st March, 1931, is a very satisfactory feature. The trades with a larger consumption in that year than in the preceding year include oil, motor engineering, asbestos, steel, flour milling and food products.

Sales to electrical engineering, which account for over one-third of the total sales in 1930-31, have risen from 6.4 million units in 1923-24 to a peak of 21.6 million units in 1929-30, the greatest progress occurring in 1924-25 and 1925-26. Next in importance to electrical engineering in 1930-31, come motor engineering, steel and flour milling. Sales to the steel industry were very small before 1924-25 but in that year they rose to a level (6.3 million units) which has not been reached again in any later year. Motor engineering has trebled its consumption in the last three years, following a decline between 1923-24 and 1927-28.

4. *Bolton Corporation.*—The Bolton Corporation Undertaking was able to go as far back as the year 1918-19 in the classification of its sales of electric power. Table IV distinguishes between industrial and non-industrial power, and between engineers, cotton spinners and weavers, textile bleachers, and collieries among industrial power users. Under the heading "non-industrial power" are included supplies to such consumers as cinemas, hotels, churches and shops.

The table shows that in the Bolton area since 1920 the cotton industry has outpaced other trades in the extension of the use of electric power. Sales to spinning and weaving firms continued to increase until 1927-28, after which a decline set in. It will be seen that the percentage growth in consumption of electric power by the cotton industry in this area between 1924 and 1930 was almost as great as the percentage increase in the capacity of electric motors (driven by purchased electricity) installed in the industry as a whole in the same period as revealed by the Censuses of Production of 1924 and 1930.* The decline in consumption after 1927-28 reflects the extension of trade depression to the fine spinning section, a great part of which is found in the Bolton district.

The quantities of electric power sold to engineers, textile bleachers and collieries are small; together they amounted only to 5.39 million units (or 14 per cent. of the total industrial power sales) in 1930-31. The depression in general engineering has brought about a slow decline in the consumption of electricity, sales to engineers being lower in 1929-30 and 1930-31 than in any previous year since 1918-19.†

* See p. 370.

† Sales to Textile Machinists are, of course, included in total sales to Engineers in Table IV, but it has been possible to extract them for the years 1921-22 to 1930-31:—

		(In million units.)			
1921-22	2.01	1924-25	1.21	1927-28	1.67
1922-23	1.41	1925-26	1.43	1928-29	1.75
1923-24	0.85	1926-27	1.40	1929-30	1.60
				1930-31	1.18

It will be seen that, except in 1930-31, the tendency to decline is less marked in these figures than in those of total sales to Engineers.

TABLE IV.
 BOLTON CORPORATION.
Analysis of Units sold in the years from 1918-19 to 1930-31.

Classification of Consumers.	Millions of Units Sold. Years ending 31st March.												
	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Engineers	7.3	4.2	5.4	5.0	3.9	4.0	4.03	4.01	4.12	3.97	3.98	3.78	3.25
Cotton Spinners and Weavers	6.9	9.0	9.6	11.0	17.1	20.1	23.96	24.2	29.58	34.41	33.35	31.66	25.36
Bleachers	0.9	1.3	1.3	1.5	1.8	2.2	2.0	1.95	2.05	2.19	2.53	2.44	1.83
Collieries	0.4	0.3	0.3	0.3	0.4	0.4	0.43	0.42	0.53	0.62	0.37	0.21	0.31
Miscellaneous Industrial Power	1.8	2.7	3.3	4.6	4.9	5.4	5.8	6.06	6.23	6.68	8.01	9.2	8.44
Total Industrial Power ...	17.3	17.5	19.9	22.4	28.1	32.1	36.22	36.63	42.56	47.87	48.24	47.29	39.19
Non-Industrial Power ...	0.24	0.26	0.3	0.4	0.3	0.3	0.35	0.42	0.69	0.83	1.02	1.39	1.64
Total Power Sales	17.54	17.76	20.2	22.8	28.4	32.4	36.6	37.1	43.3	48.7	49.3	48.7	40.83
Total Sales to Consumers ...	23.72	24.04	28.7	31.9	38.3	42.6	47.9	50.1	57.2	64.5	66.1	66.0	59.44

The "miscellaneous industrial power" item has made a useful contribution to the growth of total sales since the War. The increase from 1.8 to 8.44 million units is mainly due to supplies to railways for operating sidings and pumping plant, to sewage works and to public works contractors, rather than to the growth of "new" industries.

The total sales to consumers of this undertaking grew in satisfactory fashion until 1928-29, but in the last two years have fallen. The decline in sales to cotton concerns appears to have been mainly responsible, since it more than offsets a slight increase in sales to domestic consumers.

5. *Salford Corporation.*—Figures supplied by the Salford Corporation undertaking show that the power connections of this undertaking are spread over a large number of important trades and services, some carried on in very large units, others consisting of a multitude of relatively small users. Table V gives the capacity in horse power of electric motors connected and the number of consumers supplied in a large number of trades in the Salford Area in the years 1924 and 1931.

TABLE V.

Industries and Services.	At March 31st, 1924.		At March 31st, 1931.	
	No. of consumers.	Horse power of motors connected.	No. of consumers.	Horse power of motors connected.
Engineering Trades ...	178	6,490	187	7,453
Docks	1	6,152	1	7,203
Woodworking ...	69	5,097	110	5,349
Cotton Bleaching, Dyeing and Finishing.	24	4,025	26	6,476
Copper Works ...	1	3,062	1	3,420
Cotton Spinning, Weaving, etc.	19	2,242	17	2,373
Rubber Works ...	4	1,338	4	1,927
Sewage Disposal ...	1	1,266	3	1,306
Waterproof Cloth Manufacturing.	3	1,119	11	1,487
Wire Drawing ...	2	1,108	1	1,106
Paper Mills ...	2	886	1	1,466
Flour, Barley and Pro- vender Mills.	11	697	11	1,715
Brewing and Bottling ...	5	648	6	774
Printing ...	38	643	50	817
Chemical Works ...	19	619	18	564
Collieries ...	1	490	1	540
Garment Making...	82	330	100	423
Glass Making ...	4	212	3	442
Miscellaneous ...	482	3,903	857	7,293
Total ...	946	40,327	1,408	52,134

Total power sales in million units. 1923-24 = 22.51. 1929-30 = 38.89.*

* Figures for year ended 31st March, 1930.

Salford undoubtedly possesses an unusually varied assortment of trades, and it is made clear by the above table that the versatility and adaptability of electric power facilitate its application to the widely divergent requirements of the several industries and of establishments of varying structure and size. It appears that the six industries and services which head the table account for two-thirds of the total capacity of motors connected, and the H.P. of motors in these trades increased by 19 per cent. between 1924 and 1931. The percentage increase in the total power sales greatly exceeded that of total capacity of motors connected, which indicates a considerable growth in the consumption of electricity per H.P. of motors.* Since 1924, the number of power consumers has increased by more than one-half, mainly because of the growth in the "miscellaneous" total. In 1931, electric motors installed in 13 industries and services not mentioned in the table—including laundries and cleaning works, mortar mills and stone crushing, dye and colour making, soap and perfumery works, chocolate and sweet making, lead works, bread and biscuit making, milk dairies, wallpaper works and paint and varnish making—had reached a capacity of over 200 H.P.

6. *Mersey Power Company Limited.*—In the next table, particulars are given of the sales of electric power by the Mersey Power Company Limited in a number of years to the leading industries in its area of supply, and of the horse power of motors connected in each of these industries.

TABLE VI.
MERSEY POWER COMPANY LIMITED.
A.—Sales in Million Units.

Classification.	1926.	1927.	1928.	1929.	1930.
Building Trades ...	20·7	24·3	25·3	26·9	28·7
Engineering ...	10·2	12·5	16·0	16·9	12·9
Chemical Trades ...	3·4	4·6	5·9	8·5	10·2
Copper Refinery ...	3·4	3·7	3·9	3·7	3·1
Tanning Industry ...	1·8	2·0	2·4	2·3	2·4
Oil Refinery ...	0·1	0·3	0·5	0·8	0·9
Railways and Navigation	0·2	0·1	0·3	0·4	0·5
Public Utility ...	0·5	0·3	0·4	0·4	0·5
Miscellaneous ...	0·5	0·4	0·4	0·5	0·7
Total power sales	40·8	48·2	55·1	60·4	59·9
Bulk Supplies to other Undertakings.	8·2	15·1	14·0	15·8	8·2
Total sales for all purposes.	50·8	65·6	71·3	78·8	*

* Figures not yet available.

* It is dangerous to make superficial generalizations from figures of the H.P. of motors installed or connected. Numerous factors—such as intermittent running through chain processes, stoppages for want of orders, the maintenance of reserve or stand-by motors—preclude their being relied upon as an index of business activity or industrial development over a number of years. See Final Report of 1924 Census of Production, the Textile Trades, p. 18, for a discussion of these factors.

B.—Approximate Horse Power Connected.

Classification.	1926.	1927.	1928.	1929.	1930.
Building Trades ...	14,000	15,000	16,000	16,000	16,500
Engineering ...	7,000	8,000	8,500	8,500	9,000
Chemical Trades ...	2,450	3,000	4,000	5,000	6,000
Copper Refinery ...	2,450	2,450	2,600	2,600	2,600
Tanning Industry ...	1,400	1,800	2,000	2,000	2,000
Oil Refinery ...	270	400	600	900	1,100
Railways and Navigation	150	150	350	350	400
Public Utility ...	350	350	350	500	500
Miscellaneous ...	350	500	700	800	1,200
Total power connections.	28,420	31,650	35,100	36,650	39,300

This undertaking operates in the Runcorn district, in which chemicals, engineering and building are the leading industries. The development of its industrial power sales has been remarkably rapid since its public supply was commenced in 1912. They increased from 1.4 million units in 1912 to 7.9 in 1914, 23.6 in 1920 and 30.5 in 1923. The power load was hit badly by trade stagnation in 1921, but showed much greater resilience in 1926 and 1930. In fact, the slight fall in total power sales between 1929 and 1930 was more than accounted for by the drop in engineering alone. Apart from this one lapse in the case of engineering, the three principal industries have steadily increased their use of electric power since the War. The chemical trades, in particular, have been abandoning old processes and adopting electro-chemical processes, as, for instance, in the manufacture of caustic soda and chlorine. It is clear from the second part of the table that the increase in sales is the result of the advance of electrification of existing plant and not of the increased consumption of electricity per H.P. of motors connected. In 1930, indeed, a slight fall in total consumption in all industries went along with an appreciable growth in H.P. of motors connected.

A number of local authority undertakings which were unable to classify their power sales, freely gave us information of a more limited nature on the trend of power consumption in their areas since the War. A summary of this material is given below:—

7. *Oldham Corporation.*—In the table below, particulars are given of units sold by this Supply Authority to cotton spinners and textile machinists, in its area in each year since 1924, and total power sales for the same years.

TABLE VII.
OLDHAM CORPORATION.
Sales of Electric Power (Million units).

Year ending 25th March.	Textile		Total power Sales.*
	Cotton Spinners.	Machinists.	
1925 ...	21.95	3.67	30.89
1926 ...	22.62	5.24	33.99
1927 ...	21.20	6.50	34.10
1928 ...	21.69	6.05	34.74
1929 ...	21.48	6.53	35.39
1930 ...	21.94	8.34	38.50
1931 ...	16.14	6.10	31.11

* Including some units sold for heating purposes.

These figures show how dependent this undertaking is upon the two principal industries in its area. Even in the bad year 1930-31, sales to these two trades accounted for over 70 per cent. of the total power sales. The undertaking has done well to maintain its sales to cotton spinners at their 1924-25 level up to 1929-30, and, in addition, succeeded in more than doubling its sales to textile machinists between 1924-25 and 1929-30.

New connections to cotton spinning firms have been rare in recent years, and in the case of many firms connected, demand for power has been very much curtailed and intermittent. The moderate expansion of total power sales has been assisted by the increasing requirements of the smaller and less highly developed industries, and it is to these mainly that the undertaking must look for the further development of its power load, unless a radical improvement takes place in the condition of the staple trades of the district.

8. *Bury Corporation.*—The steady development in this area since the War has been due much more to increased consumption of electric power by old consumers or the electrification of plant of new firms *ab initio* than to the conversion of large power users from steam to electricity. This generalization is true of the leading industries—cotton, engineering and paper.

In cotton spinning and weaving, a few large and numerous very small plants are electrically driven, some by group drive, others by individual drive. It is estimated that less than one-half of the plant in these trades in the district uses electric power. Other consumers are spread over a big variety of trades, including paper making, printing, textile machinery, slippers and hat manufacture.

9. *Burnley Corporation.*—There has been no tendency here to convert from steam to electric driving in the weaving section of the cotton industry, the principal obstacles being lack of capital and uncertainty that motors installed could be worked to full capacity. At the present time, no textile firm is connected to the public supply, two firms which have converted from steam to electricity since the War having closed down. Engineering and coalmining—the other principal trades in the district—take very little electricity from the Corporation. Perhaps the largest consumers are a firm of cabinet makers and joiners who have gone over from steam since the War, and a number of printing and iron works.

10. *Nelson Corporation.*—Like most of the cotton weaving districts, Nelson has made poor progress in the electrification of plant in its staple industry. Only five weaving firms are at present buying electric power from the public supply,* and steam driving remains almost unchallenged. The largest consumer supplied by the Nelson undertaking is a brick works.

APPENDIX 9D.

Notes on the degree of electrification of mechanical equipment in the industries of the Survey Region.†

1. Table I sets out the results of a special investigation conducted recently in eight industries in the area of supply of the Manchester Corporation undertaking with a view to estimate the extent to which electric driving has been applied. A comparison is made between the capacity in horse power of electric motors connected to the public supply and the capacity in horse power of each of three types of non-electrical plant (*viz.*, steam, gas and oil) installed for direct mechanical driving.

* These cotton firms together consume less than one million units of electricity per annum, and have all commenced to buy power from the Nelson undertaking since 1920.

† See p. 252.

TABLE I.

*Area of Manchester Corporation Electricity Undertaking.
Horse-power of Plant Installed for Electrical and Mechanical Driving.*

Industries.	Public Electricity Supply.	Steam.	Gas.	Oil.	Total.
Engineering	87,522 (97·8%)	720 (0·8%)	694 (0·8%)	520 (0·6%)	89,456 (100·0%)
Cotton (Spinning and Weaving only).	24,800 (43%)	33,550 (57%)	—	—	58,350 (100·0%)
Saw Mills, Timber Yards, Packing Case Works.	3,192 (74·8%)	760 (17·8%)	252 (5·9%)	64 (1·5%)	4,268 (100·0%)
Woodworking and Cabinet Making.	1,820 (79%)	170 (7·4%)	292 (12·7%)	20 (0·9%)	2,302 (100·0%)
Rubber	20,603 (89·0%)	2,450 (10·6%)	100 (0·4%)	—	23,153 (100·0%)
General Printing (excluding Newspapers)	2,219 (89·3%)	75 (3·0%)	190 (7·6%)	—	2,484 (100·0%)
Newspaper Printing ...	11,960 (100%)	—	—	—	11,960 (100·0%)
Brick Making	577 (24·6%)	1,712 (72·9%)	45 (1·9%)	15 (0·6%)	2,349 (100·0%)
Total H.P. in eight industries.	152,693 (78·6%)	39,437 (20·3%)	1,573 (0·8%)	619 (0·3%)	194,322 (100·0%)

It appears from the foregoing table that, in the industries mentioned, steam is the only important competitor of electricity to be reckoned with, and that the competition of steam is serious only in the cotton industry and brick-making, and to a minor degree in rubber works and saw-mills, etc. In this area, as in other parts of the Survey Region, the prevailing opinion is that cotton spinning and weaving firms cannot or will not adopt electric driving (except, perhaps, as existing non-electrical plant wears out, or in equipping a new mill) on account of shortage of capital and lack of confidence in the future of the industry, and that if the further electrification of the cotton industry is economically desirable, it should be viewed as a problem to be faced by the industry as a whole or by homogeneous sections of it rather than by each unit of small resources standing in isolation. The position of engineering in Manchester is quite different from that of cotton. Electric driving is practically universal in the industry, so that henceforth the development of its demand for electricity is bound up more directly with the expansion of its business and of its productive capacity. It has been pointed out already* that there has been a substantial increase in the number of small power users in recent years in

* See above p. 356.

this area, and the above table suggests that it is to these users in the smaller and less highly developed industries rather than to the staple trades that the undertaking must look for the future expansion of its power load.

2. The *Cotton Industry* is a welcome exception to the rule that no estimate can at present be made of the degree of electrification which has been attained in the industries of the Survey Region. For this, we are indebted to the results of the Censuses of Production of 1924 and 1930,* relating to the Textile Trades. The cotton industry is so predominantly located in Lancashire and portions of the adjacent counties that Census figures relating to England, Wales and Northern Ireland or to the United Kingdom can confidently be used as being a fair reflex of conditions in the Survey Region.†

Table II gives the capacity in horse power of the prime movers classified by kinds which were installed in works in the cotton trade in the United Kingdom in each of the years 1907, 1912,‡ 1924 and 1930. Some of this primary motive power would be used to actuate generators for the production of electrical energy (which might be used for driving electric motors, for heating or lighting or in process work, or sold to outside establishments), but the greater part would be applied mechanically.

TABLE II.
Primary Power in the Cotton Trade in the United Kingdom in 1907, 1912, 1924 and 1930.

Kinds of Prime Mover.	Capacity in Horse Power of Prime Movers.			
	1907.	1912.	1924.	1930.*
Reciprocating Steam Engines.	1,210,374	1,357,148	1,332,778	1,098,236
Steam Turbines	8,593	25,380	71,196	100,597
Gas Engines	8,890	9,523	7,132	17,668
Oil Engines		181	449	
Water Power	11,355	10,769	8,068	
Total	1,239,212	1,403,001	1,419,623	1,216,501

* Figures relate to Great Britain.

* The figures for 1930 are provisional only and are taken from Preliminary Reports, No. 2, of the Fourth Census of Production (1930), "Board of Trade Journal," 24th December, 1931. They relate only to firms employing more than 10 persons on the average; but firms in the Cotton Trade employing not more than 10 persons on the average in 1924 were negligible. A number of returns for 1930 is outstanding in both the Spinning and Weaving sections, and consequently the provisional figures, particularly those for the Weaving section, slightly understate the actual power equipment of the Trade.

† See p. 97, note †, as to the proportion of the cotton industry of Great Britain and Northern Ireland which falls within the Survey Region.

‡ The Census of 1912 excluded all firms employing not more than five persons (not being proprietors). This, however, does not materially affect the comparability of the results for the Cotton Trade in 1912 with those for other Census years.

In the year 1924, 98,096 H.P., or 6.9 per cent. of the total H.P. of prime movers installed in the trade, were not in use or only occasionally in use.* In 1930, the corresponding figures were 60,205 H.P. and 5.2 per cent. It will be observed that though the capacity of steam turbines (which are used mainly for actuating electric generators) increased rapidly between 1907 and 1924, and that of reciprocating steam engines fell slightly between 1912 and 1924, and considerably between 1924 and 1930, yet steam engines still represented the great bulk of prime movers in 1930. In the aggregate, the capacity of prime movers of all kinds increased by 1.2 per cent. between 1912 and 1924, notwithstanding the decline in the employment capacity of the industry; whereas, since 1924, the capacity of prime movers has fallen by 14 per cent.

The results of the Censuses of 1924 and 1930 enable a comparison to be made between the primary motive power equipment of the Cotton Spinning and Doubling Trade and that of the Cotton Weaving Trade in each year.† Table III brings together a classification of the prime movers installed in the two sections of the Cotton Trade in Great Britain in 1924 and 1930.

TABLE III.

*Capacity of Prime Movers, classified by kinds, installed in the two sections of the Cotton Trade in Great Britain in 1924 and 1930.**

Kinds of Prime Movers.	Capacity in Horse Power.			
	Cotton Spinning and Doubling.		Cotton Weaving.	
	1924.	1930.	1924.	1930.
Reciprocating Steam Engines.	1,022,207	834,969	310,071	263,267
Steam Turbines	60,516	87,336	10,680	13,261
Others	7,618	10,960	7,604	6,708
Total	1,090,341	933,265	328,355	283,236†

* The figures for both years relate to firms employing more than 10 persons on the average.

† The percentage of the total H.P. installed which was recorded as in reserve or idle was as follows:—

Cotton Spinning and Doubling: 1924 = 5.7 per cent.; 1930 = 4.9 per cent.

Cotton Weaving: 1924 = 10.8 per cent.; 1930 = 5.0 per cent.

* Prime movers, electric generators or electric motors not in use will include equipment which is kept in reserve against breakdowns or a rush of orders and plant which has gone or is gradually going out of commission but has not yet been dismantled, as well as plant which is idle during the year through lack of orders. See Final Report on the Census of Production, 1924, Textiles Trades, p. 18.

† In both Censuses, the spinning and weaving departments of firms which were engaged in both operations were treated as one unit in regard to power equipment, and in such cases, particulars relating to the business as a whole were accepted on the schedule which covered the most important section of the business.

A number of establishments in the Cotton Trade, principally in the Weaving section, rent the whole of their power along with their factories. In 1907, such firms in the United Kingdom employed 40,400 persons, or 7.1 per cent. of the total persons employed in the Trade. The number employed had risen to 47,800 (or 7.7 per cent.) in 1912, but receded to 35,760 (or 6.8 per cent.) in 1924. In 1924, it represented 13.0 per cent. of the total number employed in the Weaving section. Unfortunately we do not know the total capacity of power equipment utilised by these establishments in any year.

The overwhelming preponderance of the steam engine among prime movers is again worthy of note. In Spinning there has been a substantial increase in the capacity of steam turbines since 1924, whereas the total capacity of prime movers in both sections has fallen by about 14 per cent.

Table IV shows the total capacity in kilowatts of electric generators installed in works in the Cotton Trade in the United Kingdom in each of the years 1907, 1912, 1924 and 1930, the generators being classified according to the kind of prime mover by which they were actuated; and Table V gives parallel information for the Cotton Spinning Trade and the Cotton Weaving Trade in 1924 and 1930. It should be noted that the electricity generated by these generators may have been used for driving electric motors or for other purposes such as heating and lighting.

The outstanding features of these tables are the relatively great increase in the capacity of steam turbines used to actuate electric generators in each of the intercensal periods, especially between 1924 and 1930, and the big absolute increase in the total capacity of electric generators in the Cotton Trade (being an increase of 200 per cent. between 1907 and 1924, and one of 43 per cent. between 1924 and 1930). There has also been an appreciable absolute increase in the total capacity of steam engines used to actuate electric generators in both sections of the trade since 1924. It should be noted that in 1930, as much as 80 per cent. of the total capacity

TABLE IV.

Capacity of Electric Generators in the Cotton Trade in the United Kingdom, 1907, 1912, 1924 and 1930.

Electric Generators driven by:—	Capacity in Kilowatts.			
	1907.	1912.	1924.	1930.*
Reciprocating Steam Engines ...	28,906	41,819	55,173	65,637
Steam Turbines ...	2,681	21,313	39,830	71,789
Gas Engines... }	487	1,337	883	4,047
Oil Engines ... }			100	
Water Power ... }			2,957	
Total ...	32,074	64,469	98,943†	141,473‡

* Figures for 1930 relate to Great Britain.

† Of this total, 9,530 kw. (or 9.6 per cent. of the total) were recorded as being ordinarily in reserve or idle during 1924.

‡ Of this total, 18,867 kw. (or 13.3 per cent. of the total) were recorded as being ordinarily in reserve or idle during 1930.

TABLE V.

*Capacity of Electric Generators in the two sections of the Cotton Trade in Great Britain in 1924 and 1930.**

Electric Generators driven by:—	Capacity in Kilowatts.			
	Cotton Spinning and Doubling.		Cotton Weaving.	
	1924.	1930.	1924.	1930.
Reciprocating Steam Engines ...	41,854	47,253	13,319	18,384
Steam Turbines	33,900	63,357	5,930	8,432
Others	3,019	2,578	921	1,469
Total	78,773	113,188	20,170	28,285†

* The figures for both years relate to firms employing more than ten persons on the average.

† The percentage of the total kw. installed which was recorded as in reserve or idle was as follows:—

Cotton Spinning and Doubling: 1924 = 6·9 per cent. ; 1930 = 14·2 per cent.

Cotton Weaving: 1924 = 20·2 per cent. ; 1930 = 8·2 per cent.

of electric generating plant installed in the Cotton Trade was to be found in the Spinning section, the percentage increase since 1924 having been rather greater in the Spinning section than in the Weaving section.

This survey of the power equipment of the Cotton Trade is completed by Tables VI and VII, which classify the capacity of electric motors found at factories in the Census years for which information is available. Table VI relates to factories in the Cotton Trade as a whole in the United Kingdom in 1912, 1924 and 1930, and Table VII to factories in each of the two sections of the Cotton Trade in Great Britain in 1924 and 1930. A distinction is made between motors driven by electricity generated in the works of the firms giving information, and motors driven by purchased electricity.*

TABLE VI.

Analysis of Capacity of Electric Motors installed at factories in the Cotton Trade in the United Kingdom in 1912, 1924 and 1930.

<i>Electric Motors installed.</i>	<i>1912.</i>	<i>1924.</i>	<i>1930.*</i>
	H.P.	H.P.	H.P.
Driven by:—			
(a) Electricity generated in own works.	46,530	92,427	118,323
(b) Purchased Electricity ...	29,903	181,145	252,237
Total	76,433	273,572†	370,560‡

* Figures for 1930 relate to Great Britain.

† Percentage of total capacity recorded as in reserve or idle: 5·6 per cent.

‡ Percentage of total capacity recorded as in reserve or idle: 8·8 per cent.

* The great bulk of purchased electricity will be taken from public supply undertakings, but there may be instances in which the vendor is another private establishment.

TABLE VII.

*Analysis of Capacity of Electric Motors installed at factories in the two sections of the Cotton Trade in Great Britain in 1924 and 1930.**

Electric Motors installed.	Cotton Spinning and Doubling.		Cotton Weaving.	
	1924.	1930.	1924.	1930.
Driven by :—	H.P.	H.P.	H.P.	H.P.
(a) Electricity generated in own works.	77,961	98,179	14,466	20,144
(b) Purchased electricity.	142,920	197,281	37,796	54,956
Total	220,881	295,460	52,262	75,100†

* Figures for both 1924 and 1930 relate only to firms employing more than 10 persons on the average.

† Percentage of total capacity recorded as in reserve or idle:

Cotton Spinning and Doubling: 1924 = 4.9 per cent.; 1930 = 8.1 per cent.

Cotton Weaving: 1924 = 8.2 per cent.; 1930 = 8.9 per cent.

Table VI brings out the important points that the capacity of electric motors installed in the cotton industry has been increasing rapidly since 1912, and that even between 1924 and 1930 there was an increase of 35 per cent. At the same time, it should be noted that since 1912 the use of purchased electricity for driving motors has made much greater headway than the use of factory-produced electricity. Thus, whereas the capacity of motors driven by factory-produced electricity almost doubled between 1912 and 1924 that of motors driven by purchased electricity was more than six times as great in 1924 as in 1912. Since 1924, however, the relative progress of purchased electricity has been less marked. In 1924, 66.2 per cent. of the total capacity of motors represented motors driven by purchased electricity; in 1930, the percentage had risen to 68.1 per cent.

It will be seen from Table VII that in 1930, four-fifths of the capacity of motors in the Cotton Trade in Great Britain were to be found in the Spinning section. The use of electricity, both factory-produced and purchased, has been extended in both sections of the industry since 1924, but the proportion of motors driven by purchased electricity is rather higher in the Weaving section than in the Spinning section.

The foregoing Census results point to the conclusions that while electric driving of machinery in the cotton industry has made considerable progress during the last decade, and the capacity of electric motors installed has greatly increased although the total capacity of primary power equipment in the industry has declined, mechanical driving is still by far the commoner mode of driving. Moreover, it appears that the number of concerns in cotton which use electric power generated in their own works is still increasing, and that competition between private generation of electricity and generation in the stations of authorised supply undertakers since 1924 has been fairly evenly waged, yielding no clear advantage to either source of supply over the other.

On this last point, it is dangerous to dogmatise, because the particulars of the increase in the capacity of motors driven by privately generated electricity and purchased electricity respectively are not necessarily indicative of the actual increase in the amount of electricity supplied from either source. The Censuses of 1924 and 1930, unfortunately, do not yield comparative figures of the quantity of electricity used in Cotton Spinning or Weaving factories in each year: information on this subject was not required compulsorily in 1924 as was the case in 1930. The following table shows the quantity used *for all purposes* in 1930 in each section of the industry.

TABLE VIII.

GREAT BRITAIN, 1930.

*Total quantity of electricity used for all purposes.**

	<i>Cotton Spinning.</i>		<i>Cotton Weaving.</i>	
	<i>Million units.</i>		<i>Million units.</i>	
Electricity generated at firms' works ...	110.0		21.4	
Purchased electricity	281.5		50.9†	
Total	391.5		72.3	

* No figures are available of the quantity used for power purposes only.

† In 1907, the total quantity of electricity purchased by *all* firms for *all* purposes in the Cotton Trade in the United Kingdom was only 10.4 million units.

In 1930, more than four-fifths of the total were used in the Spinning section; and in the industry as a whole, over 70 per cent. of the electricity used was purchased. In the year ended 31st March, 1930, the sales of electricity for power purposes by authorised supply undertakers in the Survey Region amounted to 904 million units, and sales for all purposes reached 1,276 million units. Assuming that 80 per cent. of the cotton industry of Great Britain is to be found in the Survey Region and that "purchased electricity" consists wholly of electricity purchased from authorised supply undertakers, it would appear that in 1930 rather more than one-fifth of the total sales to consumers by authorised undertakers in the Survey Region was represented by sales to the cotton industry.

Finally, the Census results enable certain estimates to be made of the amount of power available in the Cotton Trade in 1912, 1924 and 1930 for mechanical and electrical application respectively.* The estimates can only be regarded as giving a rough indication of the position in each year, because, as is well known, the total capacity of power equipment installed upon which the estimates are based, is, for several reasons, likely to exceed the actual working capacity of the plant in use at any given moment.† Since the excess affects the figures of power available for mechanical application and for electrical application fairly evenly, the estimates may not unreasonably be used to determine the proportion of the total available power which is applied electrically.

* The method used in making these estimates is that adopted in the Textile Trades volume of the Final Report on the 1924 Census of Production, pp. 20, 56, and in Appendix Q to the Eighth Annual Report of the Electricity Commissioners, 1929, p. 206.

† See the Textile Trades volume of the Final Report on the Census of Production, 1924, pp. 19, 20, and Appendix Q to the Eighth Annual Report of the Electricity Commissioners, 1929, p. 206, for discussion of the validity of estimates of available power arrived at in those Reports.

The following are the quantities and proportions estimated for the years 1912, 1924 and 1930:—

TABLE IX.

Percentage Distribution of Available Power between mechanical and electrical application in the Cotton Industry in 1912, 1924 and 1930.

	Mechanical Application H.P.	Electrical Application H.P.	Total Available Power. H.P.
(A) United Kingdom:—			
Cotton Spinning and Weaving Trades combined—			
1912	1,310,000 (94·5%)	76,000 (5·5%)	1,386,000 (100·0%)
1924	1,278,000 (82·3%)	274,000 (17·7%)	1,552,000 (100·0%)
1930*	1,016,000 (73·3%)	370,000 (26·7%)	1,386,000 (100·0%)
(B) England and Wales and Northern Ireland:—			
Cotton Spinning Trade—			
1924	967,000 (82·7%)	202,000 (17·3%)	1,169,000 (100·0%)
Cotton Weaving Trade—			
1924	295,000 (85·3%)	51,000 (14·7%)	346,000 (100·0%)
(C) Great Britain†:—			
Cotton Spinning Trade—			
1924	978,000 (81·6%)	221,000 (18·4%)	1,199,000 (100·0%)
1930	774,000 (72·4%)	295,000 (27·6%)	1,069,000 (100·0%)
Cotton Weaving Trade—			
1924	298,000 (85·1%)	52,000 (14·9%)	350,000 (100·0%)
1930	242,000 (76·3%)	75,000 (23·7%)	317,000 (100·0%)

* Figures for Great Britain.

† Figures for both 1924 and 1930 relate only to firms employing more than 10 persons on the average.

An independent estimate of the degree of electrification in the Cotton Industry in Great Britain in 1924 sets the figures at 19 per cent., which should be compared with the figures for the Cotton Industries of U.S.A. and Germany in 1925 of 66 per cent. and 49 per cent. respectively.* Since 1924, it appears, the degree of electrification in the British Cotton Industry has risen from under 18 per cent. to about 27 per cent., the rise being due partly to the big decline in the quantity of power available for mechanical application, and partly to the greatly increased capacity of electric motors installed, notwithstanding the substantial contraction of the total primary power equipment of the industry.

* These three estimates were made by the economic and statistical department of the British Electrical and Allied Manufacturers' Association.

APPENDIX 10.

The Southern Drift of Population.

The 1931 Census of Population and the annual estimates of the total of insured persons in each of the several Employment Exchange Divisions since 1922 make it clear that there has been a large increase in total and in working population in the South of England particularly in the area around London and that this increase is, in part, due to migration from other parts of the country.

The factors which govern the size of the insured population are:—

(1) The size of the total population. Everything else remaining the same, an increase of total population may be expected to bring about an increase of "occupiable" persons and an increase of insured persons.

(2) The total population remaining constant, a change in age distribution may bring a larger proportion of the population within the normally occupiable ages and augment the insured population.

(3) Apart from any change in the size, or age distribution of the total population, "occupiable" population, and with it insured population, may increase if large numbers of persons of a class which normally would not contemplate remunerative industrial work now do so, as, for example, if women previously engaged in the home enter an industrial occupation.

(4) The insured population may increase through the transfer of persons from uninsured to insured trades as, for example, by movement from agriculture or domestic service to insured occupations.

(5) Changes in the scope or the administration of an Unemployment Insurance Scheme may produce like results.

It is not possible, upon the basis of existing knowledge, to come to a definite conclusion as to the relative importance of these factors in producing the marked expansion of insured workers in the South. Nevertheless the available information seems to lend support to the view that at least part of this expansion is due either to a movement from uninsured to insured trades or to the drawing into industry of persons of a type not formerly constituting a part of the industrial working population.

It is a striking fact that in every Employment Exchange Division in England and Wales the percentage expansion of the numbers of insured persons, July, 1922—July, 1931, has been greater than the percentage increase of total population, June, 1921—April, 1931. This may be due in part to a change in the age constitution of the population which has, since 1921, increased the proportion of those between 16 and 65 years of age. Or it may be attributable, in some measure, to the operation of the Unemployment Insurance Scheme, for the possibilities of benefit under it have very probably attracted numbers of persons who do not seek continuous industrial employment, and retained in insurance persons who would normally have dropped out of industry altogether. Whilst this tendency for the insured population to expand more rapidly than the total population is common to all areas, in the London and the S.E. Employment Exchange Divisions* the disparity between the two is particularly marked. In Table I below it is shown that total population in this area increased, 1921-31, by 9.2 per cent. but insured population, 1922-31, by 21.4 per cent. A large disparity between these two percentages is found also in the South-Western Division and the Midlands, but a much smaller disparity for the other Divisions.

* These two Divisions are grouped together in order to cover the decentralization of population which has gone on in the Greater London Area.

TABLE I.

Increase of Total Population, 1921-31, and Insured Population, 1922-31, in each of the Employment Exchange Divisions.
(Total Population in 1921 = 100; Insured Population in 1922 = 100.)

Employment Exchange Division.	Total Population 1921-31.			Insured Population 1922-31†		
	Males.	Females.	Total.	Males.	Females.	Total.
London and the South-East.	110·2	108·3	109·2	120·8	122·9	121·4
S. Western ...	106·3	104·5	105·3	117·0	118·1	117·3
Midlands ...	107·6	106·9	107·2	111·9	115·6	113·0
N. Eastern ...	103·8	103·4	103·6	105·1	113·5	106·9
N. Western ...	102·5	102·6	102·6	104·7	113·0	107·4
Wales ...	97·3	97·9	97·6	98·5	115·3	100·0

† No allowance for exclusion of those over 65 years of age after January, 1923. Unfortunately, the numbers of insured persons in each Employment Exchange Division are not available for the year 1921.

It follows that the percentage increase in the number of insured persons per 100 of the total population has been greater for the Southern districts than for the other divisions and Great Britain as a whole. This is shown in Table II.

TABLE II.

Percentage Increase in the Number of Insured Persons per 100 of the Total Population in the Several Employment Exchange Divisions.

Division.	Males.	Females.	Total.
London ...	18·8	23·9	20·8
S.E. ...	10·1	13·8	10·7
S.W. ...	10·0	13·2	11·5
Midlands ...	4·2	8·0	5·5
N.E. ...	1·3	9·4	3·2
N.W. ...	2·2	9·8	4·9
Wales... ..	1·2	17·6	2·6

It does not necessarily follow, because there is this difference between the Southern Divisions and the other parts of the country, that a large number of persons are moving from uninsured to insured occupations or that industry is finding recruits among those who previously did not work for gain. Other explanations are possible:—

(1) There may have been in this London and South-Eastern Area a very rapid increase of the numbers at occupiable ages. There is some evidence that this has taken place. The increase in the total population between 1921 and 1931 was large, over 9 per cent.; but the 1931 Census shows that about half this could be attributed to migration from other parts of the country. On the whole, it would probably be safe to assume that these migrants would consist largely of fairly young and unmarried workers going South because of the demand for labour. The effect would be to increase above its previous level the proportion of the population between the insurable ages.

(2) The dissimilarities between the Southern Divisions and other areas might possibly be due to the disparity between unemployment rates to be found in them. When unemployment is heavy, as it has been in Wales, the North-Eastern and the North-Western Divisions, then numbers of young persons may attain the age of 16 years, but, because they never find employment, never come within the statistics of insured persons. In areas where employment is more easily found, as has been the case in the South East since 1922, this does not operate to the same degree, and the insured population, in relation to total population, tends to grow faster.

So far as we are aware, there is at present no method of determining statistically how far these two factors have operated to produce the marked disparity between the rates of growth of total and that of insured population in the South. There does seem to be, however, a fairly strong suggestion that the ranks of industry in the South have been swollen by movements into insured trades from uninsured occupations or by an inflow into industry of a part of the population which previously did not engage in work outside the home at all and now finds itself attracted by the increased demand for industrial workers.

This conclusion finds strong support in a study of the new entrants into Unemployment Insurance. The statistics, collected by the Ministry of Labour, of persons who enter insurance *for the first time* distinguish between juveniles 16-18 years of age and adults above 18 years. The adult entrants into insurance will be persons who either have not been working at all in this country or have been engaged in uninsured occupations.* The relation, therefore, between the number of "adult" entrants and the number of "juvenile" entrants gives some indication of the extent to which the labour force in the insured trades is being reinforced by older people taking up employment for the first time or moving from the relatively small uninsured occupations to the great bulk of occupations covered by Unemployment Insurance since 1920. When this relation is compared in the different Divisions the proportion of adults is much higher in the growing Southern Areas than elsewhere. This is shown in Table III.

It will be seen that, whilst the proportion of adult to juvenile entrant has been falling in all areas, the proportion has been consistently higher for both males and females in the South-Eastern Division than for Great Britain as a whole. For the London Division the female proportion is well above the average but the male fell below the national average, 1927-31.

It appears likely, therefore, that the labour required for the rapid industrial expansion in the South has been met, partly by an increase in population made more rapid by an inward migration from other parts of the country, partly by the drawing into industrial life, perhaps especially in the case of women, of many who were either in agriculture or domestic service, the two great uninsured occupations, or who were not accustomed to take work outside the home.

* Persons employed other than by way of manual labour are excluded from insurance if their remuneration exceeds £250 p.a. An adult entrant to insurance, therefore, might enter the insured population, without changing his occupation, through a fall in his salary.

† One further possibility, which however is not a probability, is the numbers of uninsured adults have moved from other areas and become insured for the first time in the Southern Divisions.

TABLE III.

*New Entrants into Insurance 1923-24 to 1930-31.**Proportion of "Women" Entrants to "Girl" Entrants and of "Men" Entrants to "Boy" Entrants in Several Employment Exchange Divisions.*

	LONDON.		S. EASTERN.		N. WESTERN.		GREAT BRITAIN.	
	Percentage of :		Percentage of :		Percentage of :		Percentage of :	
	Men to Boy Entrants.	Women to Girl Entrants.	Men to Boy Entrants.	Women to Girl Entrants.	Men to Boy Entrants.	Women to Girl Entrants.	Men to Boy Entrants.	Women to Girl Entrants.
1923-4*	121.0	88.7	102.4	89.9	56.2	61.4	75.5	71.6
1924-5*	98.1	79.1	86.0	79.9	47.9	57.9	63.5	65.4
1925-6	43.7	59.7	78.4	72.7	36.7	39.8	43.5	49.7
1926-7	31.1	47.5	52.4	50.0	26.8	33.3	31.9	40.6
1927-8	31.9	52.5	54.2	63.2	26.9	35.9	30.8	43.6
1928-9	23.1	49.8	49.4	62.7	22.5	29.1	27.2	40.7
1929-30	26.6	54.3	51.8	57.3	22.8	26.9	28.4	39.7
1930-31	24.1	45.4	48.0	52.1	22.1	23.1	29.1	35.2

* Systematic search for duplication of applications commenced January, 1925.

APPENDIX 11.

TABLE I.

Numbers and Percentage of Insured Persons Unemployed in Certain Industries in the Survey Region.

1929, 1930 and 1931.

	Cotton.	Distribution.	General Engineering.	Coal Mining.	Building.	Textile Finishing.	Tailoring.	Printing and Publishing.	Hotel, etc.	Tram and Bus.	Electrical Engineering.	Shirts, Underclothing.	Chemicals.	Rubber.	Bread, Cakes, etc.	All Industries.
1929. (Av. 4 months.)																
Numbers Unemployed ...	63,010	10,025	15,687	18,970	9,644	8,580	2,406	1,117	2,697	623	1,095	569	1,592	2,075	1,042	179,624
Percentage Unemployed ...	13.5	7.0	15.5	22.4	15.5	17.3	9.6	4.8	13.7	3.2	5.5	3.4	8.5	12.8	7.2	12.3
1930.																
1st Quarter Numbers Unemployed	130,468	14,656	24,683	13,069	14,039	13,186	2,634	1,758	4,489	892	1,421	912	2,196	3,044	1,551	286,775
Percentage Unemployed ...	27.7	9.7	24.7	15.4	23.6	26.7	10.8	7.4	22.0	4.5	6.7	5.1	12.3	17.6	10.0	19.3
2nd Quarter Numbers Unemployed	207,341	16,526	27,980	28,282	11,614	14,715	2,830	2,068	4,369	675	1,791	972	3,042	3,190	1,601	386,681
Percentage Unemployed ...	44.1	10.9	28.0	33.2	19.5	29.8	11.3	8.7	21.4	3.4	8.5	5.4	17.1	18.4	10.3	29.0
3rd Quarter Numbers Unemployed	220,293	19,674	32,211	27,689	13,344	18,396	4,558	1,791	4,395	761	2,206	1,966	2,977	3,573	1,690	429,223
Percentage Unemployed ...	46.9	13.0	32.2	32.5	22.4	37.3	18.3	7.5	21.5	3.8	10.5	10.9	16.7	20.6	10.9	28.8
4th Quarter Numbers Unemployed	238,007	20,454	39,974	16,502	19,131	16,368	5,036	2,538	6,349	1,143	3,060	1,963	3,756	4,201	1,889	464,114
Percentage Unemployed ...	60.6	13.5	39.9	19.4	32.1	33.2	20.2	10.6	31.1	5.7	14.5	10.9	21.1	24.3	12.1	31.2
1931.																
1st Quarter Numbers Unemployed	182,902	22,890	40,715	16,444	17,714	20,062	8,739	3,047	6,419	1,187	4,142	1,419	3,506	4,980	2,245	418,168
Percentage Unemployed ...	39.4	14.1	42.3	19.9	30.1	41.2	13.8	12.4	29.2	5.6	20.0	7.7	19.9	28.9	13.4	27.7
2nd Quarter Numbers Unemployed	197,392	22,590	42,046	27,643	14,004	17,819	2,978	2,742	5,610	863	3,649	1,494	3,622	4,451	2,258	436,219
Percentage Unemployed ...	42.6	13.9	43.7	33.5	23.8	36.6	11.0	11.2	25.5	4.1	17.7	7.7	20.5	25.8	13.5	28.8
3rd Quarter Numbers Unemployed	222,427	25,235	42,283	32,033	15,684	20,171	4,961	2,837	5,709	950	3,800	2,530	3,569	4,593	2,373	485,322
Percentage Unemployed ...	48.0	15.5	43.9	38.8	26.7	41.4	18.3	11.6	26.2	4.5	18.4	13.7	20.4	28.7	14.2	34.1

TABLE II.

*Index of Numbers of Insured Persons Unemployed in Certain Industries in the Survey Region.
Quarterly Average for 1929=100.*

	Cotton.	Distribution.	General Engineering.	Coal Mining.	Building.	Textile Finishing.	Tailoring.	Printing and Publishing.	Hotel, etc.	Tram and 'Bus.	Electrical Engineering.	Shirts, Under-clothing.	Chemicals.	Rubber.	Bread and Cakes.	All Industries.
1929 ...	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<i>1930.</i>																
1st Qtr. ...	207.0	146.2	157.3	68.9	145.6	153.7	111.6	157.4	166.4	143.2	129.8	160.3	137.9	146.7	148.8	159.7
2nd „ ...	329.1	164.8	178.4	149.1	120.4	171.5	117.6	185.1	162.0	108.3	163.6	170.8	191.1	153.7	153.6	215.3
3rd „ ...	349.6	196.2	205.3	146.0	138.4	214.4	189.4	160.3	163.0	122.2	201.5	345.5	187.0	172.2	162.2	239.0
4th „ ...	377.7	204.0	254.8	87.0	198.4	190.8	209.3	227.2	235.4	183.5	279.5	345.0	235.9	202.5	181.3	258.4
<i>1931.</i>																
1st Qtr. ...	290.3	228.3	259.5	86.7	183.7	233.8	155.4	272.8	238.0	190.5	378.3	249.4	220.2	240.0	215.5	232.8
2nd „ ...	313.3	225.3	268.0	145.7	145.2	207.7	123.8	245.5	208.0	138.5	333.2	252.0	227.5	214.5	216.7	242.3
3rd „ ...	353.0	251.7	269.5	168.9	162.6	235.1	206.2	254.0	213.9	152.5	347.0	444.6	226.1	221.3	227.7	270.2

TABLE III.
*Percentage Industrial Distribution of Insured Persons Unemployed in the
 Survey Region. 1929, 30 and 31.*

Industry.	1929.	1930.		1931.	
	3 Monthly Average.	1st Qtr.	3rd Qtr.	1st Qtr.	3rd Qtr.
Cotton	35.1	45.5	51.3	43.7	45.8
Distribution	5.6	5.1	4.6	5.3	5.2
General Engineering	8.7	8.6	7.5	9.7	8.7
Coal Mining	10.6	4.5	6.5	3.9	6.6
Building	5.4	4.9	3.1	4.2	3.2
Textile Finishing	4.8	4.6	4.3	4.8	4.2
Tailoring	1.3	0.9	1.1	0.9	1.0
Printing and Publishing	0.6	0.6	0.4	0.7	0.6
Hotel, etc.	1.5	1.6	1.0	1.5	1.2
Tram and 'Bus	0.3	0.3	0.2	0.3	0.2
Electrical Engineering	0.6	0.5	0.5	1.0	0.8
Shirts, Underclothing	0.3	0.3	0.5	0.3	0.5
Chemicals	0.9	0.8	0.7	0.8	0.7
Rubber	1.1	1.1	0.8	1.2	0.9
Bread and Cakes	0.6	0.5	0.4	0.5	0.5
Other Industries	22.6	20.1	17.1	21.0	19.9
Total	100	100	100	100	100

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