

U1

MANAGEMENT PATTERNS IN MUNICIPAL ENGINEERS' DEPARTMENTS

(two volumes)

by

ALEXANDER STANLEY MARTIN, C.Eng., FIMUNE, FIHE, MBIM.

A MASTER'S THESIS

Submitted in partial fulfilment of the requirements for
the award of the degree of Master of Science of the
Loughborough University of Technology, 1977.

Supervisor: M. J. Sargeant, MA, C.Eng., MIEE, FIProdE.

Department of Management Studies

VOLUME 1

© by Alexander Stanley Martin 1977

CONTENTS

Page:

VOLUME 1

List of Tables	6
List of Figures	8
Acknowledgements	9
Certificate of originality	11
Abstract	12
Map	12A
Preface	12B-12F
Introduction	13
Summary of Conclusions	16
<u>Chapter 1 Review of Literature, Management and</u> <u>Municipal Engineers</u>	23
1.1 Introduction	23
1.2 Analysis of articles published in the IME Journal	23
1.3 The IME Part 3 Examination,	24
1.4 Courses related to management organised by IME	25
1.5 Classification of Books in IME library	26
1.6 Books on municipal engineering	26
1.7 Financial incentive schemes	27
1.8 The awakening interest in management	27
1.9 Transformation of specialists into managers	29
1.10 Conclusions	29
<u>Chapter 2 Analysis and Synthesis</u>	34
2.1 Management - art or science	34
2.2 Methodology	37
2.3 Relationships between workload and size of workforce	39
2.4 Analysis of data for pre-LGR authorities, and prediction of employee numbers	40
2.5 Analysis of data for post-LGR authorities, and prediction of employee numbers	45
2.6 Prediction of numbers of white-collar and blue-collar employees in particular authorities	57
2.7 Employee ratios	58
2.8 Application of employee ratios	77
2.9 Tendency of authorities with similar 'productivities' to amalgamate	85

	Page:
<u>Chapter 3 Structure and organisation</u>	89
3.1 The organisational pyramid	89
3.2 Functions in post-LGR Districts	
Analysis of ALGES data	95
3.3 Effect of size	99
3.4 Productivity	102
3.5 Aspects of organisation in post-LGR authorities	104
3.6 Chief officer titles	106
3.7 Management literature, post-LGR	107
 <u>Chapter 4 Management education for municipal engineers</u>	 109
4.1 The need	109
4.2 Potential change	111
4.3 Is management teachable?	113
4.4 Conclusions	114
 <u>Chapter 5 Future work</u>	 116
 <u>Appendix 1 Background note to these studies</u>	 119
 <u>Appendix 2 IME Published articles 1873-1971</u>	 123
2.1 Purpose	123
2.2 Method	123
2.3 Overview	125
2.4 Conclusions	127
 <u>Annex 1 Numbering of IME Journals</u>	 129
 <u>Annex 2 Analysis of the numbers of IME published articles</u>	 130
2.1 Overview	130
2.2 Management articles per volume	134
2.3 Conclusions	134
 <u>Annex 3 Management subjects in the IME published articles</u>	 143
3.1 Introduction	143
3.2 Subjects - percentages	143
3.3 Number of subjects per article	143
3.4 Range of subjects	147
3.5 Earliest occurrences	150
3.6 Index	151
3.7 Conclusions	151

	Page:
<u>Annex 4 Use of References</u>	152
4.1 Introduction	152
4.2 Analysis of all the articles	152
4.3 " " the 'best' articles	155
4.4 Comparison between all articles and the 'best'	157
4.5 Authors' use of references	158
4.6 References in management articles to earlier articles in the IME Journal	159
4.7 Conclusions	160
<u>Annex 5 The IME management articles - authors and subjects</u>	161
5.1 Number of management articles per author	161
5.2 Time-lapse between management articles	161
5.3 The 'best' management articles	162
5.4 Number of 'best' articles per author	162
5.5 List of management articles in chronological order	163
5.6 " " " " " author's alphabetical order	170
<u>Appendix 3 The Syllabus for the IME Part 3 Examination</u>	180
<u>Appendix 4 Recommended Reading</u>	181
4.1 Brief Bibliography	181
4.2 A list of introductory books	181
4.3 Reviews of the books listed in paragraph 4.2	182
4.4 Conclusions on books listed in paragraph 4.2	184
4.5 A list of books suggested by IME	184
4.6 Conclusions on books listed in paragraph 4.5	187
4.7 List of publications recommended by the writer	188
<u>Appendix 5 Books</u>	190
5.1 IME Library - classification	190
5.2 Books on municipal engineering	191
<u>Appendix 6 Financial Incentive Schemes</u>	194
6.1 Introduction	194
6.2 PIB Report No. 29	194
6.3 NJC Circular NM 190	195
6.4 The questioning of the effectiveness of financial incentive schemes	195
6.5 Conclusion	197

<u>Appendix 7</u>	<u>Recent Reports which endorse the value of management training, and demonstrate the awakening interest in the subject in local government</u>	198
7.1	The Potts Report	198
7.2	PIB Report No. 29	198
7.3	PIB Report No. 45	199
7.4	The Mallaby Report	199
7.5	The Marshall Report	199
7.6	The Sharp Report	200
7.7	The Bains Report	200
7.8	British management education	200
7.9	Teaching public administration	203
7.10	CEI views	204
7.11	Mid-career training for engineers	204
7.12	Conclusions	205
<u>Appendix 8</u>	<u>Specialists into managers</u>	206
8.1	Introduction	206
8.2	General	206
8.3	The NASA Report	206
8.4	Conclusion	207
<u>Appendix 9</u>	<u>Management, art or science</u>	208
9.1	Forrester, Jay W.	208
9.2	Hanika, F. de P.	211
<u>Appendix 10</u>	<u>Questionnaires and Results</u>	214
10.1	First questionnaire, forms and letters	214
10.2	Second " " " "	221
10.3	Third " , and letter	231
<u>Appendix 11</u>	<u>ALGES Questionnaire</u>	242
<u>Appendix 12</u>	<u>An example of the prevailing attitude of managers in municipal engineering</u>	243
12.1	Correspondence	243
12.2	Extract from D.E. Lawrance's paper	244
12.3	Appreciation	245

	Page:
<u>Appendix 13 Inter-authority Comparisons</u>	247
References	249
Bibliography	254

VOLUME 2

Contents	2
Certificate of originality	3
Introduction	4
List of <u>Municipal Engineering</u> management data sheets	5
File Reference 8.00, Management Index	6
<u>Municipal Engineering</u> . Management data sheets interleaved with commentaries for each main subject	10 to 127 inclusive

LIST OF TABLESPage:

<u>Table</u>	<u>Title</u>	
1	Analysis of data for 36 'potential' new local authorities	48
2	" " " " 35 new local authorities	50
3	" " " " 37 " " "	53
4	Prediction of full-time white-collar employees	59
5	" " " blue-collar "	60
6	Responsibilities	61a-d
7	Employee ratios (pre-LGR authorities)	67
8	" " (post-LGR Districts)	74
9	Scales derived from ratios	80
10	Classification of post-LGR Districts (technical services departments) by reference to the Employee Profile Grid	82
11	Analysis of data for pre- and post-LGR local authorities	86
12	Summary of results on the 'grouping together' of birds-of-a-feather amongst 33 new local authorities	87
13	Number of employees for whom each member of staff (top 3 tiers) is, on average, responsible in post-LGR authorities	91
14	Number of employees below top 3 tiers for given spans of control	92
15	Number of tiers below third	93
16	Responsibilities of chief officers in the Districts	96
17	Numbers of chief officers who have 1 to 16 functions	97
18	Total employees and populations in 'large' and 'small' authorities	100
19	Employees per thousand population in 'large' and 'small' authorities	101
20	Response rate to the ALGES questionnaire	102
21	Classification of articles in the IME Journal 1873-1971	132
22	Analysis of subject matter in the management articles in the IME Journal 1873-1971	132
23	Number of management articles in groups of 5 volumes	135
24	Ratio of management articles to the total	137
25	Management subjects	144
26	Four subjects having over 5% occurrences	144
27	Frequency of occurrence of average number of subjects per article per volume	147
28	First mention of certain subjects	150
29	Number of references in 130 management articles	153
30	Frequency of occurrence of numbers of references	153
31	Number of references in 84 'best' articles	155

<u>Table</u>	<u>Title</u>	<u>Page:</u>
32	Frequency of occurrence of numbers of references in 'best' articles	155
33	Comparison of numbers of references in all articles and in the 'best' ones	157
34	Use of references by certain authors	158
35	Number of references in 130 management articles to earlier articles in the IME Journal	159
36	Frequency of occurrence of numbers of references to earlier articles in the IME Journal	159
37	Distribution of articles by certain authors	161
38	Data from pre-LGR authorities	234
39	Employee ratios - pre-LGR authorities	237
40	Data from post-LGR authorities	240
41	Post-LGR District authorities - full-time employee ratios	241

LIST OF FIGURES

Page:

<u>Figure</u>	<u>Title</u>	
1	Ratio of total employees/1000 population for each of the 58 pre-LGR urban authorities	63
2	Ratio of blue-collar employees/1000/population for each of the 58 pre-LGR urban authorities	64
3	Ratio of white-collar employees/1000 population for each of the 58 pre-LGR urban authorities	65
4	Ratio of blue-collar employees to white collar employees for each of the 58 pre-LGR urban authorities	66
5	Ratio of total employees/1000 population for each of 31 post-LGR Districts	70
6	Ratio of blue-collar employees/1000 population for each of 29 post-LGR Districts	71
7	Ratio of white-collar employees/1000 population for each of 31 post-LGR Districts	72
8	Ratio of blue-collar to white-collar employees for each of 29 post-LGR Districts	73
9	Diagrammatic representation of Table 7	76
10	" " " Table 8	76
11	The Cardinal Points diagram	78
12	Employee profile grid	81
13	The relationship between total employees/1000 population and the blue/white-collar ratio in 29 post-LGR Districts	83
14	Histograms showing all articles, and management articles	131
15	The number of management articles published, in groups of 5 volumes	136
16	Number of management articles/volume in order of publication	139
17	Management articles as a percentage of all articles/volume	140
18	" " " " " " " " expressed as logarithms	141
19	Management articles as a percentage of all articles/volume expressed as square roots	142
20	Frequency of occurrence of management subjects	145
21	" " " " " " " expressed as a percentage of the whole	146
22	The average number of subjects per article in each volume	148
23	Diagrammatic representation of Table 22	149
24	Number of references per article from Table 29	154
25	" " " per 'best' article from Table 31	156

ACKNOWLEDGEMENTS

Many people have assisted the writer in the research which forms the basis of this thesis and without their help it may never have been written.

He wishes therefore to express his grateful thanks to the following:

To Professor J.D. Stewart and Mr. A. Banister for supporting the application to the University in the first instance;

To the Ilkeston Borough Council (through its two Town Clerks, Mr. J. Yates and Mr. J.M. Parker), and its successor the Erewash Borough Council (through its Chief Executive, Mr. J.M. Parker) for their support;

To his municipal engineer colleagues in the East Midlands for commenting on the draft questionnaires, and for completing the final questionnaire as well as supplying supplementary information; the information supplied has been coded to maintain the promised confidentiality.

To Mr. K. Waddington and Mr. F. Turner for loaning copies of old Journals of the Institution of Municipal Engineers;

To Mr. C.B.P. Birch for allowing the Municipal Engineering management data sheets to be included in this thesis, and for supplying the requisite copies;

To Mr. M. J. Sargeaunt, his supervisor and director of research, for his guidance and encouragement through five years. During this time he has been unfailingly helpful and the relationship has been a very pleasant, stimulating, and rewarding one for the writer. He has extended the writer's knowledge base substantially towards a science orientated viewpoint, and provided numerous insights. He has been open and generous in passing on his own knowledge, and in giving his time to share many working lunches.

All the credit for the computer work, and the statistical analyses are his.

To Blake's managerial grid for the idea used in developing the cardinal points diagram;

To the Association of Local Government Engineers and Surveyors for supplying for analysis a summary of the results of a national questionnaire;

To his wife for bearing with him, and for typing most of both volumes of the thesis from manuscript.

To his secretary, Mrs. Ruby Girvan for typing the questionnaires and reminders, and issuing them, as well as typing some of the manuscript in draft; and to Mrs. Dorothy Plackett for typing some of the manuscript in draft; and to Robert Birch for drawing Figures 14, 21 and 23.

To his daughter Jill for drawing a fine plan of the region.

ABSTRACT

Comparative studies of technical services departments of local authorities in the East Midlands show that there is a positive relationship between population, and size of the workforce. There is also shown to be a positive relationship between the size of the blue-collar workforce, and the white-collar workforce. From these comparative studies formulae have been developed from which the size of the total workforce for a technical services department may be broadly predicted. Formulae have also been developed from which the size of the individual blue-collar, and white-collar workforces for technical services departments may be broadly predicted.

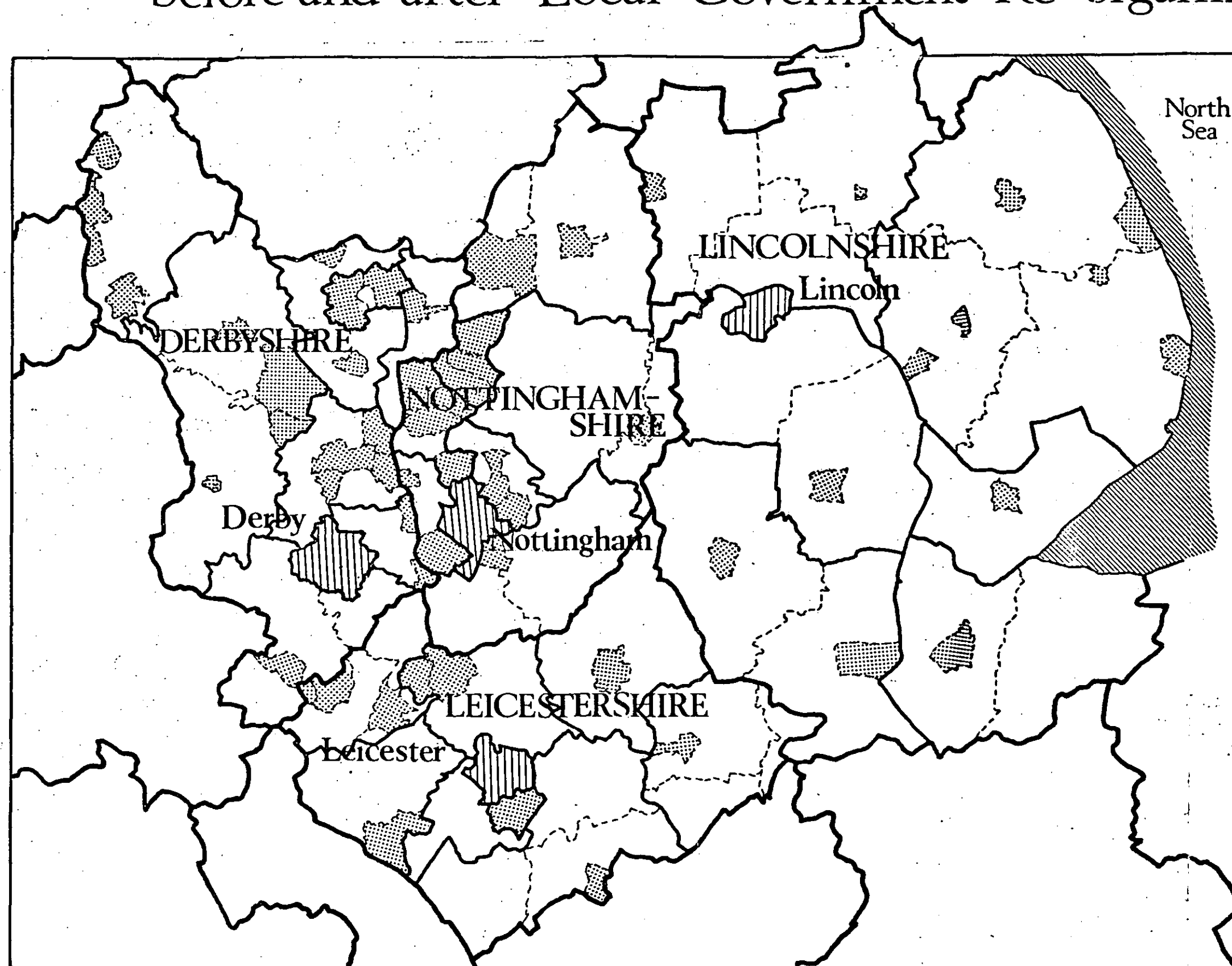
An attempt is made to use the results of these studies to classify local authorities (via their technical services departments), by means of employee ratios, and to show possible relationships between local authority policies and the size of workforces. Future work may involve similar studies of other departments. The studies suggest that spans of control of staff in the top three tiers of these departments are small, and that generally there would be fewer levels of authority within them, if spans of control were larger. A study of the first ninety-eight years of the Journal of the Institution of Municipal Engineers showed that management had throughout been a subject of interest but that a) it was heavily outnumbered by articles of engineering content, and b) the management content of the articles was very limited.

In parallel with this study the series of Municipal Engineering management data sheets for municipal engineers (each covering a part or all of a specific management topic) has been published.

Each main subject covered by a management data sheet is discussed in a commentary. Finally, suggestions are made for management education of municipal engineers.

LOCAL AUTHORITIES in the EAST MIDLANDS

before and after Local Government Re-organization



KEY

- New County Boundary
- - - New District Boundary
- ▨ Former County Borough
- ▩ Former Urban District, Borough
- - - Former Rural District Boundary

scale = 1:625,000
drawn by J. Martin



PREFACE

Objectives

The objectives of the research were set at two levels: personal and academic.

At the personal level the objectives were to experience studying within a formal setting of high standard, and to gain knowledge of quantitative studies in management.

At the academic level the objectives were to make a general examination of management in municipal engineering, and to make an examination in depth of one particular area. As will be seen later, the detailed area chosen to obtain experience in quantitative method was an examination of the influences on size and type of workforce involved in what may be broadly termed municipal engineering, and to consider value for money in terms of efficiency and effectiveness, and of size of workforce.

Review of Literature

A necessary first step was to establish the 'state of the art', i.e. to find out how much management knowledge existed in the profession of municipal engineering. To achieve this, a review of literature pertaining to municipal engineering was undertaken. This review involved examining:

- (1) the Journals of the Institution of Municipal Engineers (IME) from 1873 to 1971;
- (2) the advice given by the Institution on the books suitable for candidates for the examination in 'management and public administration', and
- (3) recent associated literature (mainly public service orientated), which had a management content.

With hindsight the review showed that, although management had been a subject which interested municipal engineers throughout the period, it was heavily outweighed by engineering matters. It also showed that the range of management knowledge covered was limited in extent. The details of the review are contained in Appendices 1-8 (pages 118-207) and in Volume 2.

Quantitative analysis of a topic in depth

Since the writer obtained his first qualification by a professional pupilship and by passing the Testamur examination of the Institution of Municipal Engineers rather than by work at a University, a research degree provided the opportunity to study modern methods of quantitative management in depth on a specific topic suggested as appropriate by the review of literature.

The topic eventually selected was the examination of the relative size of workforces in technical services departments in the East Midlands, both before local government reorganisation (LGR), when they tended to be called 'engineer and surveyors' departments, and after LGR. As will be seen from the following pages, these comparative studies show that there is a positive association between population of the authority, and size of workforce. They also show a positive association between the sizes of the blue-collar workforce and of the white-collar workforce. Formulae have been developed from these results from which the expected size of the total workforce, of the blue-collar workforce, and of the white-collar workforce for a technical services department may be broadly predicted.

Throughout the period of the research, data were analysed in convenient groups as they became available. Analyses were not always repeated later when more data were received.

An attempt is made to use the results of these studies to classify local authorities (via their technical services departments) by means of employee

ratios, and also to show possible relationships between local authority policies and the size of workforces. The Layfield Report (46) concluded that there was a need for information on practices to be disseminated to enable comparisons to be made. It is suggested that these studies go some way to meet the demand for comparative information in technical services. These results and discussions are given in Chapter 2, commencing at page 34, and readers may take in Appendices 9 and 10 as they are referred to.

Structure and organisation

The studies also gave an opportunity to examine aspects of structure and organisation in technical services departments in the East Midlands before and after LGR. The results suggest that spans of control for staff in the top three tiers in these departments are generally small, and that generally there would be fewer levels of authority within them if the spans of control were nearer the oft-quoted norm of about six. Chief officers have similar mixes of functions (though a wide variety of titles is used, particularly post-LGR), but the larger the authority the fewer tend to be the functions controlled.

These aspects of structure and organisation are set out in Chapter 3, commencing at page 89, and readers may take in Appendices 10 and 11 as appropriate. From the viewpoint of training, it is interesting to note that many chief officers appear not to be fully conversant with some of the appropriate material listed in this thesis.

Management education

Arising mainly out of the foregoing, and of potential change, consideration was given to the need for management education among engineers and this is discussed in Chapter 4, commencing at page 109, and including Appendices 12 and 13. It is concluded that there is an urgent need for engineers to be made aware of the extent of management knowledge.

Future Work

The work recorded in Chapters 1-4, the Appendices, and in Volume 2, suggest other work which may usefully be done, and this is set out in Chapter 5 on page 116 and 117.

The conclusions arising from the studies are placed at the appropriate point in the text, and for ease of reference all conclusions have been brought together in a summary which immediately follows this preface.

Degree of achievement of objectives

1. Personal

Study over the period of research yielded some insight into some of the wide range of quantitative management tools now available to the municipal engineer.

At least as valuable is the motivation given by study to study more deeply and the knowledge and discipline gained to make this depth study more realistic.

2. Academic

With hindsight, it is apparent that the inability to obtain full information will always limit the full achievement of objectives although progress has been made.

The shortage of literature relating management specifically to "municipal engineering" led the writer to the production of data sheets to fill this gap. Experience has shown that this is a never-ending task since management knowledge evolves continually.

In the study of staffing levels some significant conclusions have been drawn. Less satisfactory are the conclusions to be drawn on management structure. In particular, the reduction in the number of authorities resulting from reorganisation resulted in small samples. Methods of achieving greater fulfilment of the initial objectives are given in chapter 5, Future Work, page 116.

Reading of thesis

For a full reading of relevant matters as they arise, the sequence is as follows, and notes are given in the text to guide the reader:

- 1) Read to end of paragraph 1.1 in Chapter 1, Volume 1, page 23.
- 2) Read Appendix 1.
- 3) Read Volume 2.
- 4) Read Appendix 2 up to end of paragraph 2.2.
- 5) " Annexes 1 to 5 inclusive.
- 6) " Appendix 2 from paragraph 2.3 to the end.
- 7) " Appendices 3 to 8 inclusive.
- 8) " Chapters 3 to 5 inclusive, taking in Appendices 9 to 13 as they are referred to in the text.

For less detailed reading, the reader may read straight through Volumes 1 and 2, referring to the Appendices and Annexes as desired.

Introduction

This thesis is in two volumes. Volume 1 contains a report of the work done and the results, together with appendices which contain detail. Volume 2 contains the Municipal Engineering management data sheets together with commentaries upon them.

Chapter 1 is a review of the literature pertaining to municipal engineering management (mainly in the Journal of the Institution of Municipal Engineers) and it highlights the fact that management knowledge has been as slow coming to local government as it has been to the UK as a whole. Most of the detail which resulted from this review is to be found in the appendices.

Chapter 2 sets out the methods by which information was collected and analysed on the technical services departments of local authorities in the East Midlands, both before (pre-LGR) and after (post-LGR) local government reorganisation. It also sets out the results from which it can be seen that there is a positive relationship between population, and size of workforce. An attempt is made to use the results to classify local authorities (via their technical services departments) by means of employee ratios and to show possible relationships between local authority policies and size of workforce. These have not been publicised and it remains to be seen how useful they may be in practice. It should be emphasised that these studies are comparative ones, and thus do not deal in absolute values.

Chapter 3 is a discussion on various aspects of organisation of technical services departments. It suggests, inter alia, that there may be more levels of authority in these departments than there would be if the concept of there being reasonable spans of control for employees were universally applied within them.

Based on the discussions and the results contained in the first three

chapters, Chapter 4 discusses the management education of municipal engineers.

Chapter 5 makes suggestions for future work, including one that there should be similar analyses of data for other departments of local authorities.

Volume 2 contains the Municipal Engineering management data sheets (and commentaries upon them) which were written by the writer because of the need he foresaw in 1971, and which, it is suggested, has been verified by the findings set out in this thesis.

This thesis may be read in two main ways:

- (a) by reading chapters 1-5, together with selective readings from the Appendices and Annexes as appropriate,
- (b) by reading the relevant Appendices and Annexes in association with the main text. Readers wishing to pursue this course are guided by appropriate references to the relevant Appendix or Annex.*

References to literature published elsewhere are given by roman numerals in brackets on the line, and these references are listed on page 249 at the end of Volume 1. A short bibliography is included following the list of references, on page 254.

Throughout this thesis 'writer' refers to the writer of the thesis, whereas 'author' refers to the author of a book or article.

Before the reorganisation of local government took effect on 1 April 1974, it was usual to refer to municipal engineers' departments as the 'Engineer and Surveyor's department', or similar title. Since that reorganisation, it has been more common to use a title containing the word 'technical', and therefore in this thesis, later references to departments refer to 'technical services' departments.

Two articles based on work done for this thesis have been published

* See note overleaf.

so far, they are: (a) "Management in Municipal Engineering: a developing interest", Chartered Municipal Engineer, January 1975; (b) "District technical services departments - their functions and future", Chartered Municipal Engineer, May 1976. In both cases a suitable acknowledgement was made to both Mr. M.J. Sargeaunt and the University.

NOTE: (please refer to paragraph (b) on previous page)

For a full reading of the text, proceed as follows (there are notes in the text at the appropriate place to guide the reader to the following sequence):

- 1 Read up to the end of para 1.1 in Chapter I, Volume 1, page 23
- 2 " Appendix 1
- 3 " Volume 2
- 4 " Appendix 2 up to the end of para 2.2.
- 5 " Annexes 1 to 5 inclusive
- 6 " Appendix 2 from para 2.3 to the end.
- 7 " Appendices 3 to 8 inclusive
- 8 " Volume 1, chapters 2 to 5 inclusive, taking in Appendices 9 to 13 as they are mentioned in the text.

SUMMARY OF CONCLUSIONS*

1.0 From Chapter 1, paragraph 1.10

From Appendix 2 paragraph 2.4

- (i) There has been little discussion of management in the Journal over the period 1873-1971 compared with that of engineering (vide Annex 2, para 2.3 (i)).
- (ii) Management has been considered to be a practical skill to be acquired by trial and error on the job (vide para 2.3 ante).
- (iii) The attitude exemplified in (ii) above may stem from the concept of management solely as an art, and a widespread ignorance of the existence of a wide field of management knowledge.
- (iv) There is an increasing interest in management as a subject, as exemplified by an apparent trend to an increasing proportion of management articles being published in the Journal (vide Annex 2, para 2.3 (ii)).
- (v) The management articles concentrate on a narrow field covering administration, techniques, budgeting and work study (vide Annex 3, para 3.7 (i)).
- (vi) It appears that the number of subjects per article, and their range is increasing, especially since 1952 (vide Annex 3, para 3.7 (ii)).
- (vii) About two out of three of the management articles cite references, and there seems to be a trend towards there being fewer articles having no references at all (vide Annex 4, para 4.7 (i)).
- (viii) A higher proportion of those articles considered by the writer on a subjective basis to be most interesting (the 'best') (vide Annex 5, para 5.3) contain references, than do the management articles as a whole.
- (ix) On average the 'best' articles cite more references per article than do the management articles as a whole.
- (x) More of the articles by 'prolific' authors cite references than do the authors of the 'best' articles, but on average the 'prolific' authors cite fewer references per article than do the authors of the 'best' articles.

* The conclusions appear at appropriate points in the text and some repetition has been resorted to for clarity and convenience.

- (xi) The use of references to previously published articles in the Journal is very limited but has increased towards the end of the period examined. It is suggested that it would be useful to publish selected readings from the Journal from 1873 onwards, showing the developing interest in management.

From Appendix 4 paragraph 4.4

- (xii) Of these books suggested by Minkes, the writer suggests that only Moroney is relevant without reservation. Of the books on economics, Baumol and Dorfman are too detailed, and too much of Samuelson relates to the USA, though with selective reading it is a very good basic introduction to economics.

Ansoff is scarcely relevant to the public sector, and though Simon is, the only chapter that is really relevant directly to management for the municipal engineer is that on the new science of management decision. This is available in the form of readings.

From Appendix 4 paragraph 4.6

- (xiii) Three of these books are on the nationalised industries, those by Robson, Hanson and Shanks. This is a subject of limited interest to the local government engineer though it is desirable that he has some knowledge of this subject, and Shanks is perhaps the most useful. Miss Ogilvie-Webb's book seems to be irrelevant to the subject of management for the municipal engineer. Wiseman's book is essentially directed at elected members (and potential members) and not really of much interest to engineers studying for this examination, though of interest to more senior officers.

Blondel's book is about politics and, though interesting, would take up students' valuable time.

From Appendix 5 paragraph 5.1

- (xiv) In view of the vast amount of published material, especially (in the

context of this survey) of management and public administration material, there would seem to be a case for links to be established between the libraries of the constituent members of the Council of Engineering Institutions (CEI), the Civil Service Central Management Library (63), The Royal Institute of Public Administration (RIPA) and the British Institute of Management (BIM), to facilitate the dissemination of books and papers to corporate members of the organisations involved.

From Appendix 5 paragraph 5.2

- (xv) The approach to management in municipal engineering shown by the authors of these five books is typical of the articles the writer has identified as being on management and administration in the IME Journal. However, this narrow approach is by no means confined to municipal engineers. Professor Peter Self in Administrative theories and politics, 1972, (68) states: (page 12)

"In Europe much writing and talking about the subject (i.e. public administration) was and still is done by senior administrators themselves, who have tended to concentrate upon formal descriptions and justifications of existing machinery."

From Appendix 6 paragraph 6.5

- (xvi) Questioning of the effectiveness of financial incentive bonus schemes began at least as early as 1948 in the USA, and in the UK in 1961. It would seem that either doubts about the use of such schemes were not well enough known, or were not taken into account. In view of the widespread lack of management knowledge in the UK (vide Appendix 7, para 7.8), it may well have been the former.

From Appendix 7 paragraph 7.12

- (xvii) These several publications demonstrate the, now recognised, need for management knowledge in local government, and also show that that recognition is late in relation to the USA.
- (xviii) So far as municipal engineers in particular are concerned, it seems

that the one way to fulfil that need was not made explicit until 1974.

(xix) There seems to be a need to bring together the teaching of management and of public administration and to re-examine the teaching of public administration in non-university institutions.

(xx) From Appendix 8, para 8.4

Transforming specialists into managers is not just a question of further training. Specialists have to choose between keeping up with the latest knowledge in their particular field, and that in management. In addition, there is the further problem that, unless specialists respond to the motivational patterns that make for successful management, they are unlikely to perform the transformation satisfactorily.

2.0 From chapter 2, paragraphs 2.4 and 2.5

(xxi) There is a highly significant relationship between the number of employees in a technical services department, and the population of the authority. There is a more highly significant relationship between the number of employees in a technical services department, and the population served.* Consequently, it is possible, within broad limits, to predict from the population the number of employees required.

(xxii) This association is more highly significant for the white-collar employees than for the blue-collar employees.

(xxiii) There is a highly significant relationship between the numbers of employees engaged in each main function of a technical services department, and the population of the authority. Consequently, it is possible, within broad limits, to predict from the population, the number of employees required on each main function.

2.1 From chapter 2, paragraph 2.7

(xxiv) The range, and mix of functions will have an effect on employee ratios, but if the same functions are exercised by a department, and to the same standards, a smaller workforce suggests greater efficiency than does a larger one.

* Population served comprises population of authority plus temporary residents, e.g. holiday makers.

(xxv) It is expected that departments with a reasonable level of white-collar work on planning and control would be more efficient, and thus departments with a low blue-collar/white collar ratio (down to a limit not yet established) would be more efficient than one with a high blue/white ratio.

2.2 From chapter 2, paragraph 2.8

(xxvi) It is suggested that the Employee Profile Grid developed above may be useful in classifying authorities by means of employee ratios, thus leading to the development of inter-authority comparisons.

(xxvii) Similarly, the use of employee ratios shown in Figure 13 may lead to a similar development.

2.3 From chapter 2, paragraph 2.9

(xxviii) There is a significant difference between the 'actual' new local authorities, and those which would have resulted from combining trios of the old local authorities purely at random. Local authorities which are significantly similar have been joined together by LGR. Thus, the differences between post-LGR authorities are more marked than those between pre-LGR authorities.

3.1 From chapter 3, paragraph 3.1

(xxix) Average spans of control for the top tiers of both pre-LGR and post-LGR authorities are very small.

(xxx) The theoretical number of levels of authority may be substantially fewer than those used in practice.

3.2 From chapter 3, paragraph 3.2

(xxxi) The mix of functions for which a Chief technical officer is responsible is significantly similar; however, parks and architecture are significantly different.

(xxxii) The larger the local authority, the fewer the functions exercised by the chief officer.

3.3 From chapter 3, paragraph 3.3

(xxxiii) In examining a sample of pre-LGR authorities having small populations, it was found that departments above the mean size had smaller workforces than predicted, while departments below the mean size had larger ones. Thus the very small departments may be less efficient than the larger ones in this sample.

3.4 From chapter 3, paragraph 3.4

(xxxiv) In sum, therefore, it seems that higher pay is generally seen as the result of good performance, and in setting pay standards employers are likely to feel that higher pay will attract better performers. With increasing technology the proportion of white-collar employees to blue-collar employees has been steadily increasing. More planning of blue-collar work, and more control, increases the number of white-collar employees to the number of blue-collar employees. Therefore a higher white to blue ratio is likely to indicate greater efficiency.

3.5 From chapter 3, paragraph 3.5

This information suggests

(xxxv) that job descriptions and programme groups are widely used.

(xxxvi) The number of departments claiming written delegations from chief officer to staff, 9, seems high.

(xxxvii) The lack of knowledge displayed about theories of organisation as shown by the answers to the questions on the Burns/Stalker spectrum is perhaps not surprising, but is disturbing.

(xxxviii) The lack of use of techniques may reflect a general disenchantment of the type feelingly expressed by one chief officer. On this particular

point, the writer expressed similar views in an article (31) and claimed that a broad education, a knowledge of people, and an understanding of how organisations function, were pre-requisites of successful management.

3.6 From chapter 3, paragraph 3.6

(xxxix) A wide variety of titles is used to describe jobs which essentially cover the same range of main responsibilities (vide the analysis of the ALGES data on functions in paragraph 3.2 above).

3.7 From chapter 3, paragraph 3.7

(xl) On the whole replies seemed to confirm the conclusions of the review of management literature (vide chapter 1), and suggest that chief officers of the post-LGR authorities are not aware of the main sources of management knowledge.

(xli) It suggests also that management courses may be partially failing to meet their objectives.

4.1 From chapter 4, paragraph 4.4

(xlii) It is considered that there is an urgent need for municipal engineers to be made aware of the extent of management knowledge. This can be done through education, and through training.

Management and Municipal Engineers1.1 Introduction

In July 1971 it appeared for a number of reasons that municipal engineers were largely unaware of the vast amount of management knowledge that existed (vide Appendix 1, page 119). It seemed to be thought by municipal engineers that 'management' simply involved learning a few 'management techniques' on one or two short courses.

No really suitable books existed which would be readily acceptable in the public sector. Consequently a series of management data sheets was suggested to the Editor of Municipal Engineering, and publication began in May 1972.

Having commenced the studies for a higher degree at Loughborough University of Technology, which involved consideration of the management data sheets, it was deemed desirable to survey the 'state of the art' of management knowledge in municipal engineering to see whether the evidence supported the assumptions set out above. The survey involved identifying and reading all the articles on management (and administration) which had been printed in the Journal of the Institution since publication began in 1873, and seeking out and recording the attitudes evinced in numerous other books and papers. Details of the results of that survey are given in Appendices 1 to 8 inclusive, including the annexes to Appendix 2, and may be read in full, with Volume 2, before proceeding to Chapter 2. Chapter 1 which follows here is a summary of these Appendices.

This review is longer than usual in a thesis, and has been prepared partly as a base for future consideration of the management education of municipal engineers.

1.2 Analysis of articles published in the IME Journal

The purpose of the analysis is to obtain a broad picture of the extent

of management knowledge revealed in the articles, to establish the frequency with which subjects occur, and to identify those which are not mentioned at all. The details are shown in Appendix 2, page 123. A total of 130 articles out of 4066 were classified as having a management content.

The analysis revealed that there was hardly any mention of the pioneers of management thinking (vide Appendix 2, Annex 3, page 143), or of subjects such as organisation theory, and principles of management. For example, F.W. Taylor is mentioned only twice and Mary Parker Follett three times. There is almost no discussion on the process of management or on human relations. Many articles deal with structure, and are descriptive of the department's duties in a particular authority. The main conclusions made from the survey (vide pages 127 and 128) are:

- (a) Management generally has been considered in these articles to be a practical skill to be learned by trial and error;
- (b) This attitude stems from an ignorance of the extent of management knowledge;
- (c) Although interest in management in the early days was limited, there is now more interest in management, and there is a trend of more articles being published on the subject;
- (d) Management articles concentrate on four subjects: administration, techniques, budgeting, and work study;
- (e) The more interesting articles (vide Annex 4, page 160) use, on average, more references.

1.3 The IME Part 3 Examination

For a number of years up to and including April 1968, the title of this examination was 'Law and Administration'. From the Autumn 1968 examination, the title of the paper was changed to 'Public Administration' and a revised syllabus was introduced (vide IME Journal, Vol. 94, page 357 (1)). With effect from the Autumn 1969 examination the title of the written paper was changed to 'Management and Public Administration', but the syllabus remained the same (vide IME Journal, Vol 96, page 305 (2)).

These changes reflected the changing attitude to management in local government which is further discussed in paragraph 1.8 below.

Nevertheless, the revised syllabuses (vide Appendix 3, page 180) issued in October 1971 and July 1973, concentrated mainly on structure and functions. Two lists of books appeared in the IME Journal in 1969 (3), and the chief examiner contributed an article in 1970 to the IME Journal, Vol. 97, page 234 (4), which said, inter alia,

"Finally, reading should include some of the works of the more important authors covering local and national government, e.g. W.A. Robson, Marjorie Ogilvie-Webb, H. Victor Wiseman, J. Blondel, A.H. Hanson and Michael Shanks."

No book titles were given in the article but the Secretary of the Institution supplied to the writer (on 30.9.70) the titles of six books which are briefly reviewed in Appendix 4, page 184. On the whole, they reflect the 'economics and politics' approach to the teaching of public administration. It is therefore suggested that a book list covering a wider range of management subjects is needed.

In view of this suggestion the writer has given his own list of books, subdivided into those he considers to be essential, and those which are desirable, in Appendix 4, 4.7, page 188. In doing so he recognises that such a list is a personal choice.

1.4 Courses Related to Management Organised by the Institution

The changes in the Part III examination and the increasing interest in management led the Institution to organise a course (the first of five) in March 1969 for chief officers on the subject 'An appreciation of Management Course Potential' whose purpose was to assist chief officers in evaluating courses (vide IME Journal, Vol. 96, page 160 (5)). The bibliography to the report included five books and pamphlets which are related primarily to training (vide Appendix 4, 4.1, page 181).

Additions to this bibliography were given in the same volume, page

191 (6), and were described by the author, A.C. Minkes, as introductory books of a general nature on management. This list is somewhat narrow in the coverage of management subjects.

A new format for the course was introduced from the sixth course (October '72) onwards.

1.5 Classification of Books in the Institution's Library

The notice (vide Appendix 5, page 190) in the library in 1972 sets out twenty-one classifications under which the books in the library have been arranged. Four of the main divisions of the Universal Decimal Classification are used: 3, 5, 6 and 7. Most of the sub-divisions come within 62, 'Engineering and Technology Generally'. However, Sub-division 35, 'Public Administration' is shown, but not 65.01 'Management Theory, Method, System'; nor 651.4 'Office Practice and Routine'; nor 658.2 'Establishment, Plant and Equipment'; nor 658.3 'Personnel, Human Factor, Human Relations'.

In view of the vast amount of published material on management, there may be a case for links to be established between libraries of the constituent members of the Chartered Engineering Institutions (CEI), the Royal Institution of Public Administration (RIPA), the Civil Service, and the British Institute of Management (BIM), to facilitate dissemination of books and papers to corporate members of the organisations involved.

1.6 Books on Municipal Engineering Illustrating their Content of Management Knowledge

Five books published between 1928 and 1969 (vide Appendix 5, 5.2, page 191) show the same limited approach to management as that in the articles published in the IME Journal. This limited approach is by no means confined to municipal engineers, but seems typical of all senior public administrators in Europe.

1.7 Financial Incentive Schemes - An Example of the Municipal Engineer's Lack of Contact with Other Management Knowledge and Practice

There are 21 articles in the IME Journal which refer to financial incentive schemes (vide Appendix 6, page 194), the first of which appeared in 1933-34. In general they say that increased productivity will be obtained with the use of incentive schemes based on work study. Some mention the difficulties of implementation, of securing quality of workmanship, and in maintaining the schemes, but none questions the effectiveness of finance-based incentive schemes.

The municipal engineer was not alone in his thinking, for a similar attitude pervaded official documents from the National Board for Prices and Incomes (PIB) 1967, and from the National Joint Committee for local authorities services (Manual Workers) (vide Appendix 6, page 194), 1968. Yet the questioning of such schemes began at least as early as 1948 by Melville Dalton, in 1952 by Donald Roy, and by William Foote Whyte in the same year (vide Appendix 6, page 196).

If it be objected that those were American authors writing in American journals and therefore not readily accessible to municipal engineers in the U.K., the same could not be said for a booklet by Tom Lupton, Money for Effort (7), which was published by HMSO for DSIR in 1961 as one of a series called 'Problems of Progress in Industry' (No.11). He concluded that the successful application and effectiveness of such schemes depended on much more than crude theories of motivation and 'good' personnel policies (vide Appendix 6, page 197).

1.8 The Awakening Interest in Management

Several official reports published in the late '60s and early '70s drew attention to the importance of management training in local government (vide Appendix 7, page 198).

For example, the Mallaby Report, Staffing of local government 1967 (8),

said that principal officers, and in many cases their immediate subordinates, have to exercise management responsibilities and it recommended training in management for such staff at an appropriate stage in their careers (Appendix 7 (7.4) page 199).

Three years later, the Marshall report on Highway maintenance (9) said that running a highway maintenance organisation required substantial management skills but pointed out that there was no tradition of management training in local government. It said that there was a failure to recognise the need for management training, and stated that the most senior officers concerned with highway maintenance should form part of a local authority's central management team and " ... be fully versed in the latest overall management techniques". (Appendix 7, 7.5, page 199).

Also published in 1970 was Lady Sharp's report on Transport Planning (10). Within the report was another report by Messrs. Urwick, Orr and Partners Ltd., which concluded, inter alia, that there would be a need for technical and managerial skills for transport planning which were in the main "... outside the existing knowledge and experience of local government..." (Appendix 7, 7.6, page 200).

Two years later, in 1972, the Bains report (11) was published and this said management skills were equally necessary to senior officers as professional knowledge and ability (Appendix 7, 7.7, page 200).

However, the lack of awareness of the need for management knowledge was not confined to municipal engineers, nor to local government. Mildred Wheatcroft, in a book published in 1970 (12) (Appendix 7, 7.8, page 200), reviewed the state of management education in the U.K. She pointed out that there had been very little education in management until comparatively recently, but that it had expanded in the previous decade. Attempts are made to distinguish between 'business studies' and 'management education', and between 'education' and 'training'. These are, in her view, very difficult to sustain. The universities have been slow to concede that

business or management studies were suitable subjects for university education. Richard A. Chapman (13) (Appendix 7, 7.9, page 203) has severely criticised the quality of teaching of public administration in non-university institutions, as well as the inadequate support given by government to the teaching of public administration generally. In addition to the need for management knowledge being made available to local government officers generally, there is also a need for it to relate specifically to their work. As R.G.S. Brown points out in The administrative process in Britain (14), page xi, Burns, Lupton, Joan Woodward and others have made considerable additions to available knowledge but that there is little attempt to apply their methods of analysis to the problems of British public administration. He says that his conclusions underline the need for research into, among other things, structure, communication, implications of size and complexity on organisational structure, and relationships between specialists and generalists. A joint report (15) published in 1974 by three chartered engineering institutions (vide Appendix 7, 7.11, page 204), including IME, shows belatedly an appreciation of the wide extent of management knowledge required of professional engineers.

1.9 Specialists into Managers

Transforming specialists into managers is not just a question of further training. Specialists have to choose between keeping up with the latest knowledge in their particular field, and that in management (vide Appendix 8, page 207). In addition, there is the further problem that unless specialists respond to the motivational patterns that make for successful management, they are unlikely to perform the transformation satisfactorily.

1.10 Conclusions

The following conclusions result from the foregoing review of the literature on management in municipal engineering (though it is not

suggested that it is worse than in any other part of the public sector).

From Appendix 2, paragraph 2.4

- (i) There has been little discussion of management in the Journal over the period 1873-1971 compared with that of engineering (vide Annex 2 para 2.3 (i)).
- (ii) Management has been considered to be a practical skill to be acquired by trial and error on the job (vide para 2.3 ante).
- (iii) The attitude exemplified in (ii) above may stem from the concept of management solely as an art, and a widespread ignorance of the existence of the wide field of management knowledge.
- (iv) There is an increasing interest in management as a subject, as exemplified by an apparent trend to an increasing proportion of management articles being published in the Journal (vide Annex 2, para 2.3 (ii)).
- (v) The management articles concentrate on a narrow field covering administration, techniques, budgeting and work study (vide Annex 3, para 3.7 (i)).
- (vi) It appears that the number of subjects per article, and their range, is increasing, especially since 1952 (vide Annex 3, para 3.7 (ii)).
- (vii) About two out of three of the management articles cite references, and there seems to be a trend towards there being fewer articles having no references at all (vide Annex 4, para 4.7 (i)).
- (viii) A higher proportion of those articles considered by the writer on a subjective basis to be most interesting (the 'best') (vide Annex 5, para 5.3) contain references than do the management articles as a whole
- (ix) On average the 'best' articles cite more references per article than do the management articles as a whole.
- (x) More of the articles by 'prolific' authors cite references than do the authors of the 'best' articles, but on average the 'prolific' authors cite fewer references per article than do the authors of the 'best' articles.

(xi) The use of references to previously published articles in the Journal is very limited but has increased towards the end of the period examined. It is suggested that it would be useful to publish selected readings from the Journal from 1873 onwards, showing the developing interest in management.

From Appendix 4, paragraph 4.4

(xii) Of the books suggested by Minkes, the writer suggests that only Moroney is relevant without reservation. Of the books on economics, Baumol and Dorfman are too detailed, and too much of Samuelson relates to the USA, though with selective reading it is a very good basic introduction to economics.

Ansoff is scarcely relevant to the public sector, and though Simon is, the only chapter that is really relevant directly to management for the municipal engineer is that on the new science of management decision. This is available in the form of readings.

From Appendix 4, paragraph 4.6

(xiii) Three of these books are on the nationalised industries, those by Robson, Hanson and Shanks. This is a subject of limited interest to the local government engineer though it is desirable that he has some knowledge of this subject, and Shanks is perhaps the most useful. Miss Ogilvie-Webb's book seems to be irrelevant to the subject of management for the municipal engineer. Wiseman's book is essentially directed at elected members (and potential members) and not really of much interest to engineers studying for this examination, though of interest to more senior officers.

Blondel's book is about politics and, though interesting, would take up students' valuable time.

From Appendix 5, paragraph 5.1

(xiv) In view of the vast amount of published material, especially (in the context of this survey) of management and public administration material,

there would seem to be a case for links to be established between the libraries of the constituent members of the Council of Engineering Institutions (CEI), the Civil Service Central Management Library (63), The Royal Institute of Public Administration (RIPA), and the British Institute of Management (BIM), to facilitate the dissemination of books and papers to corporate members of the organisations involved.

From Appendix 5, paragraph 5.2

- (xv) The approach to management in municipal engineering shown by the authors of these five books is typical of the articles the writer has identified as being on management and administration in the IME Journal.

However, this narrow approach is by no means confined to municipal engineers. Professor Peter Self in Administrative theories and politics 1972 (68), states: (page 12)

"In Europe much writing and talking about the subject (i.e. public administration) was and still is done by senior administrators themselves, who have tended to concentrate upon formal descriptions and justifications of existing machinery."

From Appendix 6, paragraph 6.5

- (xvi) Questioning of the effectiveness of financial incentive bonus schemes began at least as early as 1948 in the USA, and in the UK in 1961. It would seem that either doubts about the use of such schemes were not well enough known, or were not taken into account. In view of the widespread lack of management knowledge in the UK (vide Appendix 7, para 7.8), it may well have been the former.

From Appendix 7, paragraph 7.12

- (xvii) These several publications demonstrate the, now recognised, need for management knowledge in local government, and also show why that recognition is late in relation to the USA.
- (xviii) So far as municipal engineers in particular are concerned, it seems that the one way to fulfil that need was not made explicit until 1974.

(xix) There seems to be a need to bring together the teaching of Management and of public administration and to re-examine the teaching of public administration in non-university institutions.

(xx) Transforming specialists into managers is not just a question of further training. Specialists have to choose between keeping up with the latest knowledge in their particular field, and that in management. In addition, there is the further problem that, unless specialists respond to the motivational patterns that make for successful management, they are unlikely to perform the transformation satisfactorily.

2.1 Management - Art or Science.(i) Municipal engineers' view of management

It is concluded from the analysis of articles published in the Journal of the Institution of Municipal Engineers (vide Appendix 2, paragraph 2.4, (ii) and (iii), page 127, that municipal engineers have considered management to be a practical skill to be acquired by trial and error on the job, and that this attitude may stem from the concept of management solely as an art coupled with a widespread ignorance of the existence of the wide field of management knowledge.

(ii) Management - art or science

Jay W. Forrester (16) discusses the development of management from its start as an art, and he is quoted extensively in Appendix 9, (page 208). He says that management is in transition from an art, based only on experience, to a profession, based on an underlying structure of principles and science. He says that any worthwhile human endeavour emerges first as an art - we succeed before we understand why. The development of the underlying sciences (of medicine and engineering) was motivated by the need to understand better the foundation on which the art rested.

He says that without an underlying science, advancement of an art eventually reaches a plateau. Management has reached such a plateau.

He says that the separation between management and management science is now closing. Management research is being realigned to coincide with the objectives of practising managers.

Finally, he says that management science must evolve effective

methods to analyse the principal interactions among all the important components of an organisation and its external environment.

Harold Koontz and Cyril O'Donnell (17) state (chapter 1) that the most productive art is based on an understanding of the science underlying it. Thus, they say, science and art are not mutually exclusive but are complementary. They say that the study and analysis of management have lagged behind other sciences until recent years, and as in other fields, the development of an underlying science must precede improved practice. They say:

"It is often pointed out that the social sciences are 'inexact' sciences, as compared to the 'exact' physical sciences. It is also sometimes indicated that management is perhaps the most inexact of the social sciences. It is true that the social sciences, and management in particular, deal with complex phenomena about which too little is known. It is true, likewise, that the structure and behaviour of the atom are far less complex than the structure and behaviour of groups of people."

"But we should not forget that even in the most exact of the 'exact' sciences - physics - there are areas where scientific knowledge must be replaced with speculation and hypothesis. As much as is known of bridge mechanics, there are still cases where bridges fail through such causes as vibrations set up from wind currents. And as we move from the longer-known areas of physics into the biological sciences, we find that areas of exactness tend to diminish."

"Since virtually all areas of knowledge have tremendous expanses of the unknown, people working in the social sciences should not be defeatist. A scientific approach to management cannot wait until an exact science of management can be developed."

"Another reason for the delay (i.e. in the development of a theory of management) has been the preoccupation of economists with political economy and the non-managerial aspects of business."

"One might expect that political science would have been the father of a theory of management, since the administration of policies is one of the major tasks of government, and government itself is the oldest and most comprehensive form of social organisation. Yet, despite its obvious importance, early political theorists were slow to turn their attention to the problem of administration."

"Some of the early contributions to the theory of management, nevertheless, have come from scholars in the field of public

* The authors probably mean to use hypothesising to lead to an extension of the frontiers of knowledge rather than use it to 'replace' scientific knowledge.

"administration, and important contributions have continued to come from this source at an accelerated pace. "

A somewhat contrary view is put by R.J.S. Baker (18), who says (introduction):

"Nowhere will we claim the title 'science' for the study of public administration. Science, properly so-called, must surely always include not only the formulation of systematic hypotheses, but also linking them up with and testing them by controlled experiment and/or measured observation - experiments or observations which can be independently replicated and tested. All this is accepted as axiomatic in the natural sciences and no doubt in large areas of the social sciences.

"The subject of public administration, however, is in constant flux, sometimes observable only from within, sometimes only from a distance. It never stands still to allow replicated and controlled experiments and the amount of measured observation that can be carried out is limited."

F. de P. Hanika (19), whose introduction is reproduced in Appendix 9, (page 211), expresses views which follow Forrester, Koontz, and O'Donnell, rather than Baker, though Baker's views about science are not in question. Hanika says that management is at the point of emerging from the barber-surgeon stage that medical science had reached about two hundred years ago.

(iii) A point of view

George Sturt (20) said:

"But no higher wage, no income, will buy for men that satisfaction which of old - until machinery made drudges of them - streamed into their muscles all day long from close contact with iron, timber, clay, wind and wave, horse-strength. It tingled up in the niceties of touch, sight, scent. The very ears unawares received it, as when the plane went singing over the wood, or the exact chisel went tapping in (under the mallet) to the hard ash with gentle sound. But these intimacies are over. Although they have so much more leisure men can now taste little solace in life, of the sort that skilled hand-work used to yield to them. Just as the seaman to-day has to face the stoke-hole rather than the gale, and knows more of heat-waves than of sea-waves, so throughout. In what was once the wheelwright's shop, where Englishmen grew friendly with the grain of timber and with sharp tool, nowadays untrained youths wait upon machines, hardly knowing oak from ash or caring for the qualities of either. And this is but one tiny item in the immensity of changes which have overtaken labour throughout the civilised world. The products of work are, to be sure, as important as ever - what is to become of us all if the dockers will not sweat for us or the miners risk their lives? That civilisation may flourish a less-civilised working-class must work

"But, leaving such large matters, I would speak of a smaller one. Is there - it is worth asking - such laughter about labour, such fun, such gamesome good temper, as cheered the long hours in my shop in 1884? Are we not taking industry too seriously to be sensible about it? Reading of 'Scientific Management' I recall something quite different from that - something friendly, jolly, by no means scientific - which reached down to my time from an older England. A mischievous spirit itself freshened one up sometimes."

(iv) Application to local government

There does not appear to have been any research undertaken into the management of municipal engineers' departments and therefore it was decided to carry out some investigations into technical services departments (as they came to be called after local government reorganisation in 1974), and to analyse the results with a view to making a contribution to the development of management from an art to a science, in local government.

2.2 Methodology

(i) Introduction

The methodology comprises two parts:

- (a) the collection of information through questionnaires from certain local authority technical services departments, both before and after local government reorganisation (LGR) which took effect on 1 April 1974.
- (b) the analysis of that information in various ways but importantly by multiple linear regression, using a standard program of the least squares method.

(ii) Collection of information

The first questionnaire was sent out with a letter on 28 July 1973 before local government reorganisation to those 110 local authorities (counties, county boroughs, boroughs, urban districts, and rural

districts) which would remain in the four counties (Derbyshire, Leicestershire, Lincolnshire and Nottinghamshire) after LGR. Together with the letter and the main questionnaire (green) was sent an individual questionnaire for each person in the top three tiers to complete.

A copy of each of these three documents is reproduced in Appendix 10 together with a summary of the data which were collected as a result of the main questionnaire in Table 38.

By September 1973 many completed forms had been returned, and a reminder (see Appendix 10) was sent out in September to those who had not returned the main questionnaire (green).

Also in September 1973 a supplementary questionnaire 1A (pink) was sent out to certain local authorities seeking more information than they had supplied in the first questionnaire.

A copy of this letter, and questionnaire, is reproduced in Appendix 10. In November 1974 (i.e. after LGR), a second questionnaire was circulated to 37 new local authorities (counties and districts). Because of the utility of the analyses of the data for the pre-LGR authorities, considerably more information was sought in this questionnaire. As before, an individual questionnaire was circulated for completion by senior staff. A reminder was sent out to certain authorities on 6 March 1975. Copies of the letters and second questionnaire, individual questionnaire and the reminder are reproduced in Appendix 10.

This second questionnaire, being very long, was completed by few local authorities. The essential information required for analysis related to the functions undertaken and the total number of employees. Consequently, a third questionnaire was sent out seeking this information from those authorities who had not completed the second

questionnaire. Copies of the letter and third questionnaire are reproduced in Appendix 10. A summary of the data collected is reproduced in Table 40, in Appendix 10.

(iii) Analysis

The analysis of data relating to population and numbers of employees was done by multiple linear regression using a standard program of the method of 'least squares'.

2.3 Relationships Between Workload and Size of the Workforce

(i) Introduction

In 1973 there were no available ways of estimating the required size of a workforce in a technical services department. The size of the workforce should be related to the workload, but how to measure the load?

It would be expected that the workload would vary from one authority to another, from one season to another, and from year to year. Some authorities supplement their own workforces by the use of consultants and/or contractors. The size of the workforces will be affected by employment policies of each authority.

The pre-LGR authorities (counties, county boroughs, boroughs, urban districts, and rural districts) discharged differing functions. The main factor which may be expected to affect workload is population, since numbers of people largely determine the amount of service needed - e.g. the number of dustbins to be emptied, miles of road to be swept (i.e. house frontages) and lengths of sewers to be cleansed.

Research undertaken in connection with Local Government Re-organisation (21) showed, for example, a relationship between the number of architects employed full time on educational work and

population. A relationship between non-teaching staff in primary schools and in secondary schools, and population was also shown.

It was also found that population per mile of road had a positive effect on expenditure per mile of road (22).

The first analysis in 1973 of population and numbers of white and blue collar employees using multiple linear regression showed a highly significant association between these variables.

The population used at this point for these analyses is the resident population and does not include holidaymakers who, for towns like Skegness, may have a substantial effect on workload. A subsidiary factor which may be expected to contribute to workload is 'expectation'. It may further be expected that the 'expectation' in rural areas is less than that in urban areas. For example, research undertaken in connection with local government reorganisation (22) states

"Social class was also found to have a positive effect... on expenditure on unclassified roads. As agreed above, the 'Social class' variable is likely to affect the quantity and quality of a service provided by a local authority: the higher the index of social class for an authority, the larger the amount of expenditure one would expect by that authority."

2.4 Analysis of Data for Pre-LGR Authorities

(i) Introduction

Analysis of data from 106 authorities shows positive relationships between variables as follows:

(a) population/authority and workforce/authority

(Hypothesis 1, $r = +0.8$)

(b) blue-collar workforce and white-collar workforce

(Hypothesis 2, $r = +0.96$)

(c) total employees/population, and blue/white-collar workforce

(Hypothesis 3, $r = +0.49$)

Analysis of data from 46 'urban' authorities gave a similar result to that in (c) above (Hypothesis 4, $r = +0.49$). Further analyses of these data for these 106 authorities show positive associations between population and the size of the blue-collar workforce (Hypothesis 5, $r = +0.903$), and the white-collar workforce (Hypothesis 6, $r = +0.907$) engaged in the five main functions examined, i.e. engineering, architecture, town planning, recreation, and building control.

(ii) Hypothesis 1

That there is a positive association between X and Y where X = population (thousands), and Y = total employees. Data from 106 local authorities were used.

Results: $r = +0.838$
 constant (intercept) = + 46.67
 coefficient (gradient) = + 1.95
 $F = + 245.88$

V_1 (upper degrees of = 1
 freedom)

V_2 (lower degrees of = 104
 freedom)

probability of occurrence by pure chance = 0.37×10^{-28} ,
 which is highly significant.

From the value for r it can be seen that there is a very good correlation between the variables, and thus the hypothesis is validated.

Predictive formula:

$$\text{Total employees (per authority)} = 46.67 + \left[1.95 \times \frac{\text{population}}{1000} \right]$$

The constant of 46.67 is large, and therefore the program was varied to force the curve through zero, which, while virtually eliminating the constant, does not provide the best fit.

Results: $r = +0.82$

Constant (intercept) = 0

Coefficient = + 2.15

F = + 207.5

V_1 = 1

V_2 = 104

Probability of occurrence by pure chance = 0.158×10^{-25} ,
which is highly significant.

From the value of r it can be seen that there is a very good correlation between the variables, and thus the hypothesis is validated.

Predictive formula:

Total employees (per authority) = $2.15 \times \frac{\text{population}}{1000}$

(iii) Hypothesis 2

That there is a positive association between X and Y

where X = number of blue-collar employees

Y = " " white-collar employees

Data from 106 local authorities were used.

Results:

$r = + 0.964$

Constant (intercept) = - 4.71

Coefficient = + 0.37

F = + 1354.4

V_1 = 1

V_2 = 104

probability of occurrence by pure chance = 0.187×10^{-60} ,
which is highly significant.

From the value of r it can be seen that there is a very good correlation between the variables, and thus the hypothesis is validated.

Predictive formula:

Number of white-collar employees (per authority) = $-4.7 + 0.37$ (number of blue-collar employees)

Having examined separately the relationships: employees/1000 population, and blue/white collar employees, it was decided to examine them together, which led to hypothesis 3.

(iv) Hypothesis 3

That there will be a positive association between X and Y

$$\text{where } X = \frac{\text{total employees}}{\text{population (thousands)}}$$

$$\text{and } Y = \frac{\text{No. of blue-collar employees}}{\text{No. of white-collar employees}}$$

Data from 106 local authorities were used.

Results: $r = + 0.49$

$$\text{constant (intercept)} = + 1.95$$

$$\text{coefficient} = + 0.45$$

$$F = + 32.96$$

$$V_1 = 1$$

$$V_2 = 104$$

probability of occurrence by pure chance = 0.943×10^{-7} ,
which is highly significant.

From the value of r it can be seen that there is a good correlation between the variables, and thus the hypothesis is validated.

Predictive formula:

$$\text{Total employees per 1000 population} = 1.95 + 0.45$$

$$\left[\frac{\text{No. of blue-collar employees}}{\text{No. of white-collar employees}} \right]$$

(v) Hypothesis 4

That when the effect of certain functions is removed by considering only the 'urban' authorities, there will still be a positive association between X and Y

$$\text{where } X = \frac{\text{total employees}}{\text{population (thousands)}}$$

$$\text{and } Y = \frac{\text{No. of blue-collar employees}}{\text{No. of white-collar employees}}$$

Data from 46 'urban' type authorities were used.

Results: $r = + 0.49$

$$\text{constant (intercept)} = + 2.45$$

$$\text{coefficient} = + 0.44$$

$$F = + 14.01$$

$$V_1 = 1$$

$$V_2 = 44$$

probability of occurrence by pure chance = 0.293×10^{-3} ,
 which is highly significant.
 From the value of r it can be seen that there is a good correlation
 between the variables, and thus the hypothesis is validated.

Predictive formula:

$$\begin{aligned} \text{Total employees/1000 population} &= 2.45 + 0.44 \times \\ &\times \frac{\text{No.of blue collar employees}}{\text{No.of white " " " "}} \end{aligned}$$

(vi) Hypothesis 5

That there is a positive association between numbers of
 blue-collar employees, and the population (taking into account
 only those functions undertaken by the Department).

Data from 106 authorities were used.

Results:

$$r = + 0.903$$

$$\text{constant (intercept)} = + 17.72$$

$$\text{coefficients: engineering} = + 0.45$$

$$\text{architecture} = + 0.04$$

$$\text{recreation} = + 0.46$$

$$\text{building control} = + 1.04$$

$$F = + 72.90$$

$$V_1 = 1$$

$$V_2 = 99$$

probability of occurrence by pure chance = 0.169×10^{-12}
 which is highly significant. Thus the hypothesis is validated.

The coefficients set out above when multiplied by the popula-
 tion may be used individually in respect of each function, to show
 the variation from the total prediction which arises from that
 function.

(vii) Hypothesis 6

That there is a positive association between numbers of white-collar employees and the population (taking into account only those functions undertaken by the department).

Data from 106 authorities were used.

Results:

$$r = + 0.907$$

$$\text{constant (intercept)} = - 0.17$$

$$\text{coefficients: engineering} = + 0.46$$

$$\text{architecture} = + 0.07$$

$$\text{town planning} = - 0.48$$

$$\text{recreation} = - 0.15$$

$$\text{building control} = + 0.60$$

$$F = + 76.31$$

$$V_1 = 1$$

$$V_2 = 99$$

$$\text{Probability of occurrence by pure chance} = 0.664 \times 10^{-3}$$

which is highly significant. From the high level of this significance, it can be seen that the hypothesis is validated.

The coefficients set out above, when multiplied by the population (1000s), may be used individually in respect of each function to show the variation from the total prediction which arises from that function. It is considered that the negative values occur because numbers of white collar employees in town planning and recreation are very small, and in many cases non-existent.

2.5 Analysis of data for post-LGR authorities

The results are tabulated in order of significance for each run.

The result for the first individual variable in each table is the most significant in that set. Succeeding ones may be auto-correlated by it.

At any level of significance it must be borne in mind that the correlation may be spurious rather than showing a true causal relationship.

Levels of significance - definitions

	code
Approximate P (probability) is 5% = 0.05 = probably significant	*
" " " " 1% = 0.01 = significant	**
" " " " 0.5% = 0.005 = highly significant	***
" " " " 0.1% = 0.001 = very highly significant	****

(1) 'Potential' new authorities

Before data were available for the post-LGR authorities, the data from the pre-LGR authorities were combined into 36 new authorities (33 Districts, and 3 Counties), and analysed, as in paragraph 2.4 above by multiple linear regression. The results are given in Table 1, page 48, and show a very highly significant association between population, and size of workforce.

(ii) Key to variables

Column 1	=	Total workforce
2	=	Blue-collar workforce
4	=	Blue/white
5	=	pop/1000 engineering
6	=	pop/1000 architecture
10	=	pop(1000s)
11	=	type of local authority previously
12	=	engineering F1
13	=	architecture F2
14	=	town planning F3
15	=	recreation F4
16	=	building control F5

Hypothesis 7

That for the 'potential' post-LGR authorities (composed of data from the pre-LGR authorities), there is a positive association between population and number of white-collar, and of blue-collar employees engaged on each main function.

The results of run B1 are given in Table 1.

The approximate probability given shows a very highly significant association between the size of the total workforce, and the functions of town planning, building control, and architecture, with a highly significant result for recreation.

The effect of these functions on predicting the total workforce is as follows:-

Best estimate of Total workforce = $72.7 + 0.85/1000$ population

Variations for functions are:

town planning	= - 1.64/1000 population
building control	= + 1.09/1000 "
architecture	= + 0.28/1000 "
recreation	= - 1.31/1000 "

It is considered that the negative values occur because of the small number of authorities exercising the function, and/or the small number of employees engaged on the function.

Hypothesis 8

That for the 'potential' post-LGR authorities there is a positive association between the total number of employees, and the number of blue collar employees. The results are given, runs B4 and B5, in the Table 1.

In both cases there is a very high correlation between the variables ($r = + 0.99$), and the approximate probability shows a very highly significant result. Thus the hypothesis is validated.

Run	Sample size	Dep. Variable Column	Other Variables Column	Sign of Coeff.	r	Approx. P	Signif
B1	36	1	All	+	0.9	$0.2 \cdot 10^{-7}$	****
			14	-	0.78	$0.2 \cdot 10^{-7}$	****
			16	+	0.76	$0.7 \cdot 10^{-7}$	****
			13	+	0.64	$0.2 \cdot 10^{-4}$	****
			15	-	0.57	$0.2 \cdot 10^{-3}$	***
B2	36	1	All	+	0.9	$0.1 \cdot 10^{-7}$	****
			11	-	0.88	$0.3 \cdot 10^{-11}$	****
			10	+	0.83	$0.4 \cdot 10^{-9}$	****
			14	-	0.78	$0.2 \cdot 10^{-7}$	****
			16	-	0.76	$0.7 \cdot 10^{-7}$	****
			5	-	0.71	$0.9 \cdot 10^{-6}$	****
			13	-	0.64	$0.2 \cdot 10^{-4}$	****
B3	36	1	All	+	0.89	$0.7 \cdot 10^{-11}$	****
			11	-	0.88	$0.3 \cdot 10^{-11}$	****
			10	+	0.83	$0.4 \cdot 10^{-9}$	****
B4	33	1	2	-	0.99	$0.3 \cdot 10^{-36}$	****
B5	33	2	1	+	0.99	$0.3 \cdot 10^{-36}$	****

TABLE 1. Analysis of data for 36 'potential' new local authorities.

These analyses were done by multiple linear regression using a standard program of the "least squares" method (vide paragraph 2.2 (iii), page 39). The description of each variable (column) is given in paragraph (ii) page 46. r = correlation coefficient, and P = approximate probability ^{by pure chance.} The explanation for the symbols in the column headed significance is given on page 46, lines 3 to 7 inclusive.

(iii) The 35 new local authorities

When data had been collected from the technical services departments of 35 of the new authorities, these were analysed and the results are given in Table 2 (page 50). From these analyses it will be seen that there is no correlation between population and numbers of part-time employees. A part-time employee is reckoned as half a full-time employee for this purpose.

Subsequently it was noted that The Local Government Manpower Watch (23) reckon a part-time employee as 0.41 of a full-time employee.

There are very highly significant associations between population and the size of workforces, for differing groups of the 35 authorities.

(iv) Key to variables

Column 1 = number of white-collar full-time employees per authority
Column 2 = " " " part-time " " "
Column 3 = " " blue-collar full-time " " "
Column 4 = " " " part-time " " "
Column 5 = population.

The 35 authorities include the 30 Districts in the East Midlands, and South Norfolk, and the 4 Counties in the East Midlands, for which data were collected.

The 30 authorities are the Districts in the East Midlands, for which data were collected. A summary of the data collected is given in Appendix 10.

Run	Sample size	Dep. Variable Column	Other Variables Column	Sign of Coeff.	r	Approx. P	Signif.
C1	35	1	ALL	+	0.86	$0.4 \cdot 10^{-9}$	****
			3	+	0.84	$0.2 \cdot 10^{-9}$	****
			5	+	0.64	$0.3 \cdot 10^{-4}$	****
C2	35	3	5	+	0.6	$0.2 \cdot 10^{-3}$	***
C3	35	2	4	+	0.2	NA	-
C4	35	2	5	+	0.2	0.3	-
C5	35	4	5	+	0.3	0.1	-
C6	30	1	ALL	-	0.88	$0.1 \cdot 10^{-8}$	****
			5	+	0.86	$0.2 \cdot 10^{-8}$	****
			3	+	0.8	$0.5 \cdot 10^{-7}$	****
C7	30	1	5	+	0.82	$0.2 \cdot 10^{-8}$	****
C8	30	3	5	+	0.79	$0.2 \cdot 10^{-6}$	****
C9	30	2	4	+	0.1	NA	-
C10	30	2	5	-	0.08	NA	-
C11	30	4	5	+	0.05	NA	-

TABLE 2. Analyses of data for 35 new local authorities

From Table 2 it will be seen that there is no correlation for part-time employees (either blue or white collar) and the populations. This may be partly due to the difficulty of including seasonal workers in the answers to the questionnaire as no special provision had been made for them.

The 35 authorities

From run C1 it can be seen that there is a very highly significant correlation between the variables, with 74% of the variance explained.

Predictive formula:

$$\begin{aligned} \text{Number of white-collar full-time employees} \\ = 5.85 + \left(\frac{0.09 \times \text{population}}{1000} \right) + (0.3077 \times \text{FT Blue}) \end{aligned}$$

From run C2 it can be seen that there is a highly significant correlation between the variables, with 35% of the variance explained.

Predictive formula:

$$\text{Number of blue-collar full-time employees} = 141 + \left(\frac{0.58 \times \text{population}}{1000} \right)$$

The 30 authorities

From run C6 it can be seen that there is a very highly significant correlation between the variables, with 78% of the variance explained.

Predictive formula:

$$\begin{aligned} \text{Number of white-collar full-time employees} \\ = - 34.7 + \left(\frac{0.84 \times \text{population}}{1000} \right) + (0.17 \times \text{FT blue}) \end{aligned}$$

From C7 it can be seen that there is a very highly significant correlation between the variables, with 67% of the variance explained. In this case the line was forced through zero.

Predictive formula:

$$\text{Number of white-collar full-time employees} = 0.96 \times \frac{\text{population}}{1000}$$

From C8 it can be seen that there is a very highly significant correlation between the variables, with 61% of the variance explained. In this case the line was forced through zero.

Predictive formula

$$\text{Number of blue-collar full-time employees} = 2.26 \times \frac{\text{population}}{1000}$$

(v) The 37 new local authorities

Data were collected from the technical services departments of 37 of the new authorities, and were analysed and the results are given in Table 3.

From these analyses it will be seen that there were very highly significant associations between populations and workforces in various groupings of the authorities.

(vi) Key to variables

Column 1	number of white full-time employees			
2	"	"	part-time	"
3	"	"	blue full-time	"
4	"	"	part-time	"
5	"	"	white full-time	" + $\frac{\text{white PT}}{2}$
6	"	"	blue	" + $\frac{\text{blue PT}}{2}$
7	"	"	full-time white plus full-time blue employees	
8	population			

There are data for 37 authorities including 31 Districts in the East Midlands, 2 Districts in Norfolk, and 4 Counties in the East Midlands. The 31 East Midland Districts include 3 large urban areas (Nottingham, Leicester, and Derby).

The 37 authorities

From run D1 it can be seen that in general there is a highly significant association between the variables shown, with 49% of the

Run	Sample size	Dept. Variable	Other Variables	Sign of Coeff.	r	Approx. P	Signif.	
D1	37	Column 8	Column ALL	+	0.7	$0.4 \cdot 10^{-2}$	***	All authorities
			1	-	0.64	$0.2 \cdot 10^{-4}$	****	
			5	+	0.63	$0.2 \cdot 10^{-4}$	****	
			7	+	0.63	$0.3 \cdot 10^{-4}$	****	
			3	+	0.59	$0.1 \cdot 10^{-3}$	****	
			6	-	0.58	$0.2 \cdot 10^{-3}$	****	
D2	33	8	ALL	+	0.87	$0.2 \cdot 10^{-5}$	****	all Districts
			1	-	0.85	$0.3 \cdot 10^{-9}$	****	
			5	+	0.85	$0.3 \cdot 10^{-9}$	****	
			7	+	0.83	$0.3 \cdot 10^{-8}$	****	
			3	-	0.76	$0.2 \cdot 10^{-6}$	****	
			6	+	0.75	$0.5 \cdot 10^{-6}$	****	
D3	33	7	8	+	0.83	$0.3 \cdot 10^{-8}$	****	
D4	29	8	ALL	+	0.87	$0.2 \cdot 10^{-4}$	****	E.M.Districts
			1	-	0.85	$0.4 \cdot 10^{-8}$	****	
			5	+	0.85	$0.4 \cdot 10^{-8}$	****	
			7	-	0.84	$0.1 \cdot 10^{-7}$	****	
			3	+	0.79	$0.4 \cdot 10^{-6}$	****	
			6	+	0.77	$0.9 \cdot 10^{-6}$	****	
D5	30	8	ALL	+	0.68	$0.3 \cdot 10^{-3}$	****	Districts (less large urbans)
			1	+	0.68	$0.4 \cdot 10^{-4}$	****	
			3	+	0.41	$0.3 \cdot 10^{-1}$	*	
D6	30	1	8	+	0.68	$0.4 \cdot 10^{-4}$	****	ditto
D7	30	3	8	+	0.41	$0.3 \cdot 10^{-1}$	*	ditto
D8	30	1	8	+	0.63	$0.2 \cdot 10^{-3}$	****	ditto
D9	30	3	8	+	0.38	$0.4 \cdot 10^{-1}$	*	ditto

TABLE 3. Analyses of data for 37 new local authorities.

variance explained when all variables are used in the prediction. In the multiple regression with all variables the value of r for variables 1 (full-time white-collar employees) and 5 (full-time plus part-time white collar employees) is similar, but in the former case the sign of the coefficient is negative and in the latter positive. Also from run D1 it will be seen that the value for r for variables 3 (full-time blue-collar employees) and 6 (full-time + part-time blue-collar employees) is similar, but the coefficient of the former is positive and the latter is negative. This suggests some weakness in the power of part-time employees in the total prediction. This is confirmed by other analyses which also suggest that there is no positive association between population and numbers of part-time employees. It is thought that part-time employees also includes (at least in some instances) seasonal employees.

The 33 Authorities

From run D2 it can be seen that there is a very highly significant correlation between the variables, with 76% of the variance explained.

The 29 Authorities

From run D4 it can be seen that there is a very highly significant correlation between the variables, with 76% of the variance explained.

The 30 Authorities

From run D5 it can be seen that there is a very highly significant correlation between the variables with 46% of the variance explained.

Predictive formulae (Districts)

In the case of run D8 (Table 3), and run D9 (Table 3), the line was forced through zero. From run D8, the best estimate of full-time white collar employees = $0.783 \times \text{pop. (1000s)}$. From run D9, the best estimate

The analyses in Table 2 were done by multiple linear regression using a standard program of the "least squares" method (vide paragraph 2.2 (iii), page 39). The description of each variable (column) is given in paragraph (iv), page 49. r = correlation coefficient ^{by pure chance,} and P = approximate probability. The explanation for the symbols in the column headed significance is given on page 46, lines 3 to 7 inclusive.

of full-time blue collar employees = $1.916 \times \text{pop.}(1000\text{s})$. Thus the best estimate of total full-time employees = $(0.783 + 1.916) \times \text{population}(1000\text{s})$.

Summary

The dominating variable in these regressions is the number of white-collar full-time employees.

The best statistical prediction of pre-LGR staff was obtained from the variables: population served, and type of authority. The consistency of functions performed by similar pre-LGR authorities means that the incorporation of functions actually performed did not add significantly to the quality of prediction as it did with the greater variation in similar post-LGR authorities.

The best statistical prediction for post-LGR staff was obtained by the physical variables: population served, functions performed, the individual authority, and population density. Population density for pre-LGR authorities correlated highly with the type of authority, e.g. rural or urban. Thus, by the use of population density in the pre-LGR prediction, it is possible to provide a common method of forecasting to link staff pre-LGR and post-LGR.

It must, however, be pointed out that the use of type of authority in the pre-LGR forecasts gives marginally better significance than population density.

(continued on page 57)

(page 56 is omitted)

Conclusions

These conclusions are derived from the analyses in paragraphs 2.4 and 2.5.

- (i) There is a highly significant relationship between the number of employees in a technical services department, and the population of the authority. There is a more highly significant relationship between the number of employees in a technical services department, and the population served.*

Consequently, it is possible, within broad limits to predict from the population the number of employees required.

- (ii) This association is more highly significant for the white-collar employees than for the blue-collar employees.
- (iii) There is a highly significant relationship between the numbers of employees engaged in each main function of a technical services department, and the population of the authority. Consequently, it is possible, within broad limits, to predict from the population the number of employees required on each main function.

2.6 Prediction of Numbers of White Collar and Blue Collar Employees

It was decided to predict numbers of employees from other variables, to show the value that would have been expected if a particular authority were the same as its peers.

The formula used for predicting the number of white-collar employees (which was derived from run C6, Table 2) was the best of three which were evaluated. It is

$$\text{Number of employees} = -34.72 + (0.84444 \times \frac{\text{population}}{1000}) + (0.16626 \times \text{FT blue})$$

The results are given in Table 4.

The predictive formula used for blue-collar employees (which was derived from run C8, Table 2) was the best of two which were evaluated.

* population served comprises population of authority plus temporary residents, e.g. holiday makers.

It is:

$$\text{Number of employees} = -42.081 + (2.5706 \times \frac{\text{population}}{1000})$$

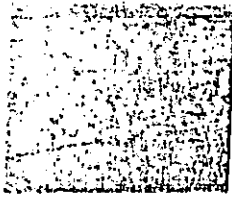
The results are given in Table 5.

A letter was sent to thirty authorities on 9 February, 1976, stating the basis for the predictions, and enclosing copies of the tabulations of results and the table of responsibilities (Table 6) for each of the authorities. None of the authorities was named in the tables of numbers of employees, nor of responsibilities in order to preserve confidentiality, but each authority was informed of its own prediction of employees, and of responsibilities. The table showing responsibilities enables a chief officer to compare his own with others to assist in evaluating the results of the predictions.

2.7 Employee Ratios


- (i) The relationship between numbers of employees and the population has been analysed above (paras 2.4 and 2.5). It was desired to examine the ratios of full-time employees per 1,000 population. These ratios for the pre-LGR East Midland authorities are given in Table 39, Appendix 10.

text continues on page 62

Local Authority	L.A. Code	Full Time White Collar Employees		Difference Between Actual & Predicted	% Difference on Predicted	Ranking of % Difference
		Actual	Predicted			
	A	495	355.1	+139.9	39.4	10
	B	199	317.3	-118.3	37.2	12
	C	175	201.3	- 26.3	13.1	23
	D	130	75.0	+ 55.0	73.3	4
	E	120	82.5	+ 37.5	45.5	8
	F	120	46.8	+ 73.2	156.4	2
	G	114	160.5	- 46.5	28.9	18
	H	113	120.9	- 7.9	6.5	27
	I	98	91.6	+ 6.4	7.0	26
	J	92	58.5	+ 33.5	57.3	7
	K	69	48.2	+ 20.8	43.2	9
	L	67	80.7	- 13.7	17.0	21
	M	67	70.0	- 3.0	4.3	31
	N	63	96.3	- 33.3	34.6	15
	O	62	57.3	+ 4.7	8.2	25
	P	48	70.3	- 22.3	31.7	17
	Q	44	66.9	- 22.9	34.2	16
	R	44	46.1	- 2.1	4.6	29
	S	37	39.0	- 2.0	5.1	28
	T	36	37.7	- 1.7	4.5	30
	U	32	42.3	- 10.3	24.3	19
	V	32	40.0	- 8.0	20.0	20
	W	29	25.5	+ 3.5	13.7	22
	X	26	10.2	+ 15.8	154.9	3
	Y	24	21.5	+ 2.5	11.6	24
	Z	21	33.9	- 12.9	38.1	11
	AA	31	22.6	+ 8.4	37.2	13
	BB	20	30.7	- 10.7	34.9	14
	CC	18	63.8	- 45.8	71.8	5
	DD	17	42.0	- 25.0	59.5	6
	EE	7	-6.6	+ 13.6	206.1	1

NB: A positive difference indicates a local authority with more staff than predicted, and a negative difference indicates a local authority with fewer staff than predicted.

TABLE 4. Prediction of Full Time White-Collar Employees in Technical Services Departments

Local Authority	L.A. Code	Full Time Blue Collar Employees		Difference Between Actual & Predicted	% Difference on Predicted	Ranking of % Difference
		Actual	Predicted			
	A	848	715.5	+132.5	18.5	19
	G	683	206.6	+476.4	230.1	1
	B	658	696.6	- 38.6	5.5	26
	H	415	221.5	+193.5	87.4	2
	C	313	518.1	-205.1	39.6	12
	N	276	217.0	+ 59.0	27.2	17
	M	258	146.2	+111.8	76.5	4
	L	248	183.8	+ 64.2	34.9	13
	I	221	230.7	- 9.7	4.2	27
	E	220	203.3	+ 16.7	8.2	24
	Q	207	162.5	+ 44.5	27.4	16
	P	187	183.1	+ 3.9	2.1	29
	J	163	159.3	+ 3.7	2.3	28
	D	152	215.1	- 63.1	29.3	15
	U	128	127.6	+ 0.4	0.03	30
	F	123	143.7	- 20.7	14.4	22
	R	117	144.6	- 27.6	19.1	18
	W	112	84.6	+ 27.4	32.4	14
	BB	108	102.3	+ 5.7	5.6	25
	Z	99	116.6	- 17.6	15.1	20
	O	96	189.4	- 93.4	49.3	10
	S	83	140.4	- 57.4	40.9	11
	CC	81	216.9	-135.9	62.7	6
	AA	79	92.5	- 13.5	14.6	21
	DD	73	154.6	- 81.6	52.8	9
	X	67	60.8	+ 6.2	10.2	23
	T	55	150.4	- 95.4	63.4	5
	Y	48	104.7	- 56.7	54.2	8
	V	23	173.8	-150.8	86.8	3
	EE	16	35.4	- 19.4	54.8	7
	K	0	210.4	-210.4	-	-

NB: A positive difference indicates a local authority with more manual workers than predicted and a negative difference indicates a local authority with fewer manual workers than predicted.

TABLE 5. Prediction of Full Time Blue-Collar Employees in Technical Services Departments

TABLE 6.

Responsibilities

Local Authority	STAFF INTENSIVE							MANUAL WORKERS INTENSIVE						
	A							B						
Code	Town Planning	Building Control	Architecture	HIGHWAYS			Traffic Mgmt.	Sewerage	Land Drainage	Housing Maintenance	Recreation	Refuse Collection	Refuse Disposal	OTHER
				Maintenance	Improvements	Design								
FF				✓	✓	✓	✓						✓	
I			✓	✓				✓	✓	✓	✓			
S			✓	*✓				✓	✓		✓			
E		✓	✓	✓	*✓	*✓	✓	✓				✓	✓	
C				✓	*✓	*✓	✓	✓	✓	*✓		✓		
D	✓	✓	✓	✓				✓	✓		✓			
Q				✓				✓	✓		✓	✓		
O			✓	✓				✓			✓			
Z			✓	✓				✓	✓	✓	✓	✓		
U	✓	✓	✓								*✓			
GG				✓	✓	✓	✓		✓				✓	
DD			✓					✓	✓		✓	✓	*✓	
BB				✓	*✓	*✓	*✓	✓	✓	✓	✓	✓	*✓	

*Environmental only

*Some. IGs, lighting, vehicle maintenance, public conveniences

*Some.

Lighting, markets, fairs, IGs, cemeteries, vehicle maintenance.

GIAs.

*Some.

*Some.

*Some.

TABLE 6. Continued (2)

Local Authority	STAFF INTENSIVE							MANUAL WORKERS INTENSIVE					
	Town Planning	Building Control	Architecture	HIGHWAYS			Traffic Mgmt.	Sewerage	Land Drainage	Housing Maintenance	Recreation	Refuse Collection	Refuse Disposal
				Maintenance	Improvements	Design							
Code													
J	✓	✓	✓	✓	*	*	*	✓	✓				
B		✓		✓	*	*	*	✓	✓			✓	
X		✓	✓	✓	*	*	*	✓		✓	✓	✓	*
R	✓	✓	✓	✓	*	*	*	✓	✓	✓	✓		
AA	✓	✓	✓	✓	*	*	*	✓	✓	✓	*		
EE		✓	✓					✓		✓	✓		
II				✓	✓	✓	✓						
W	✓	✓	✓	✓				✓	✓		✓	✓	*
K	✓	✓	✓					*	*		*		
M		✓		✓	✓	✓	✓	✓	✓		*	✓	✓
T			✓					✓		✓	*		
Y			✓					✓		*	✓		

Other

*Some. Environmental Health.

*Some. Lighting, building maintenance, markets, public conveniences.

*Some.

*Some.

*Some. Building maintenance

*Some. Crematorium.

*Design only.

*Some. Cemeteries, crematorium.

*Some. Vehicle maintenance, markets, public conveniences.

*Some. Markets.

TABLE 6. Continued (3)

Local Authority	STAFF INTENSIVE							MANUAL WORKERS INTENSIVE						
	Code	Town Planning	Building Control	Architecture	Maintenance	Improvements	Design	Traffic Mgmt.	Sewerage	Land Drainage	Housing Maintenance	Recreation	Refuse Collection	Refuse Disposal

Other

*Environmental only. IGs, vehicle maintenance, cemeteries/crematorium.

*Environmental only.
Environmental health, housing management, transport.

Transport, depots and stores, estates, cemeteries, markets.

*Some.

Transport.

*Some. Redevelopment, GIAs, lighting, markets, transport.

*Some. GIAs, transport, public conveniences.

Car parks, vehicles and plant, estates, lighting, building maintenance.

*Some. Markets.

*Some.

TABLE 6. Continued (4)

NB: Even where there is no direct responsibility for building control, structural calculations are normally undertaken.
Most of the departments shown seem to be responsible for design of highways and sewers on new housing and industrial estates.

(ii) The ratios shown in respect of the technical services departments of the 58 pre-LGR urban authorities shown in Table 39 have been abstracted and plotted in Figures 1 to 4. Figure 1, page 63 shows the ratio: total employees/1,000 population, plotted for each of the urban authorities.

If each department exercised the same duties, and to the same standards, points which fall nearer the x axis show greater productivity. Figure 2, page 64, shows the ratio: blue-collar employees/1,000 population, plotted for each of the urban authorities. If each department exercised the same duties, and to the same standards, points which fall nearer the x axis show greater productivity. Figure 3, page 65, shows the ratio: white-collar employees/1,000 population, plotted for each of the urban authorities. If each department exercised the same duties, and to the same standards, points which fall nearer the x axis show greater productivity. Figure 4, page 66, shows the ratio: blue-collar employees/white-collar employees, plotted for each of the urban authorities.

If all the white-collar employees are directly associated with the blue-collar work (e.g. in planning and control of work), then a smaller ratio (to a limit which has not been established) suggests more planning and control of work, and thus (hopefully) greater productivity. Thus points which fall nearer the x axis suggest greater productivity.

(iii) Data for the 58 pre-LGR urban authorities extracted from Table 39 are given in Table 7, page 67.* These data have been grouped in quartiles, 15 authorities being allotted each of the top and bottom quartiles, and 28 to the middle.

Of the 15 authorities with blue-collar ratios in the top quartile,

text continues on page 68

Figure 1

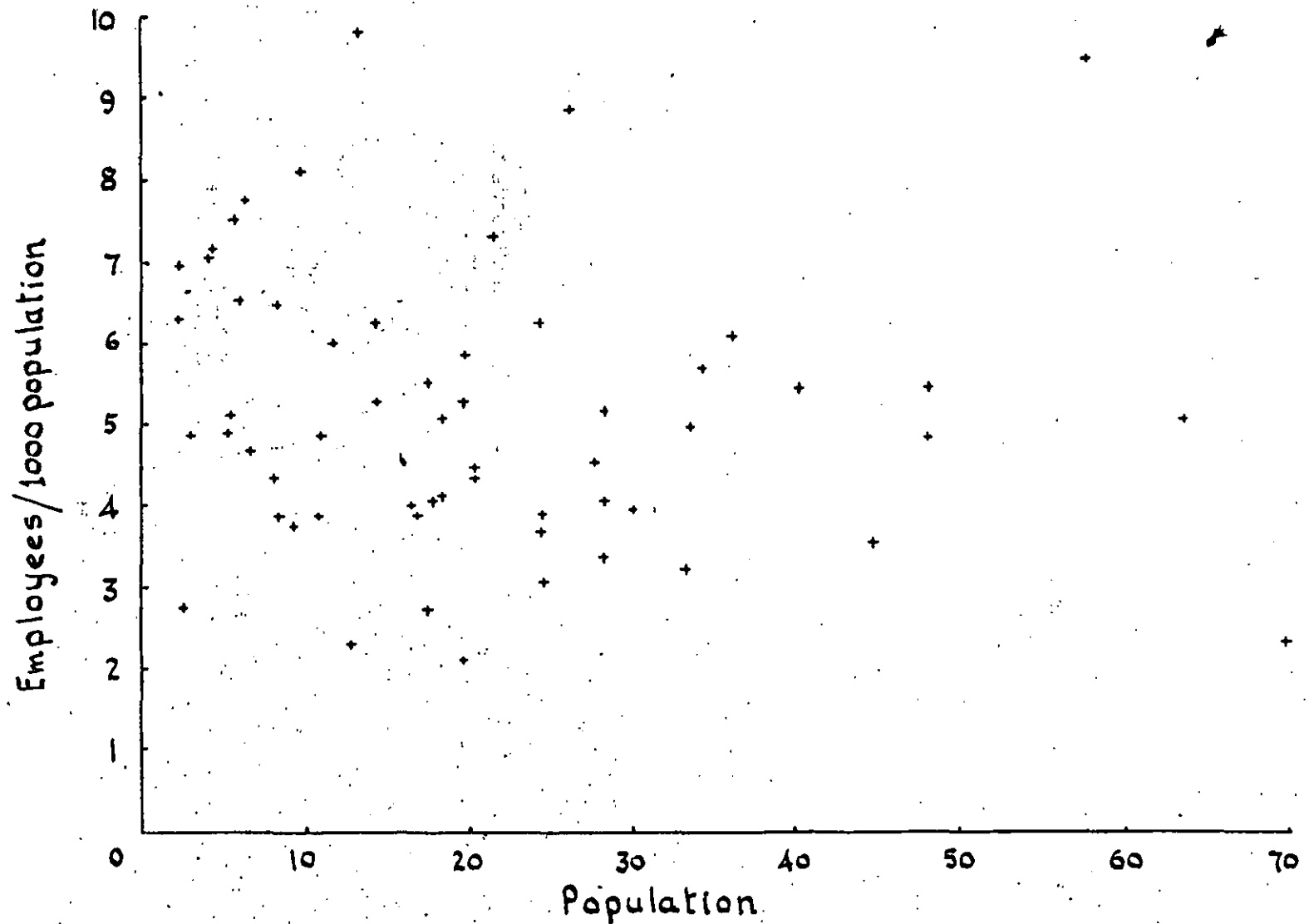


Fig.1 Ratio of total employees/1000 population for each of 58 pre-LGR urban authorities.

* The purpose of the following discussion is to highlight differences and similarities in the employment policies of local authorities for white-collar employees vis-a-vis those for blue-collar employees in pre-LGR authorities.

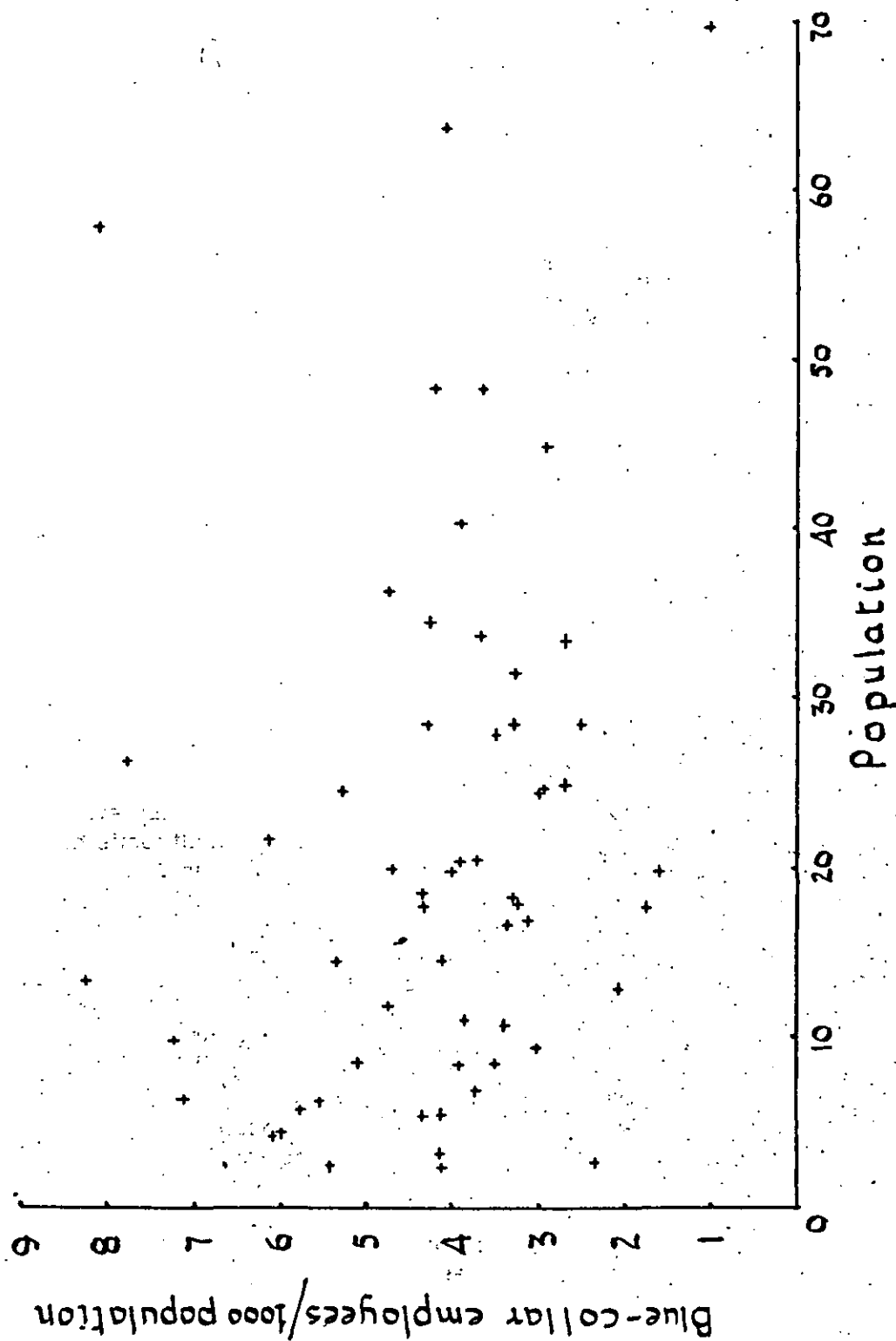


Fig.2. Ratio of blue-collar employees/1000 population for each of
58 pre-LGL urban authorities.

Figure 2

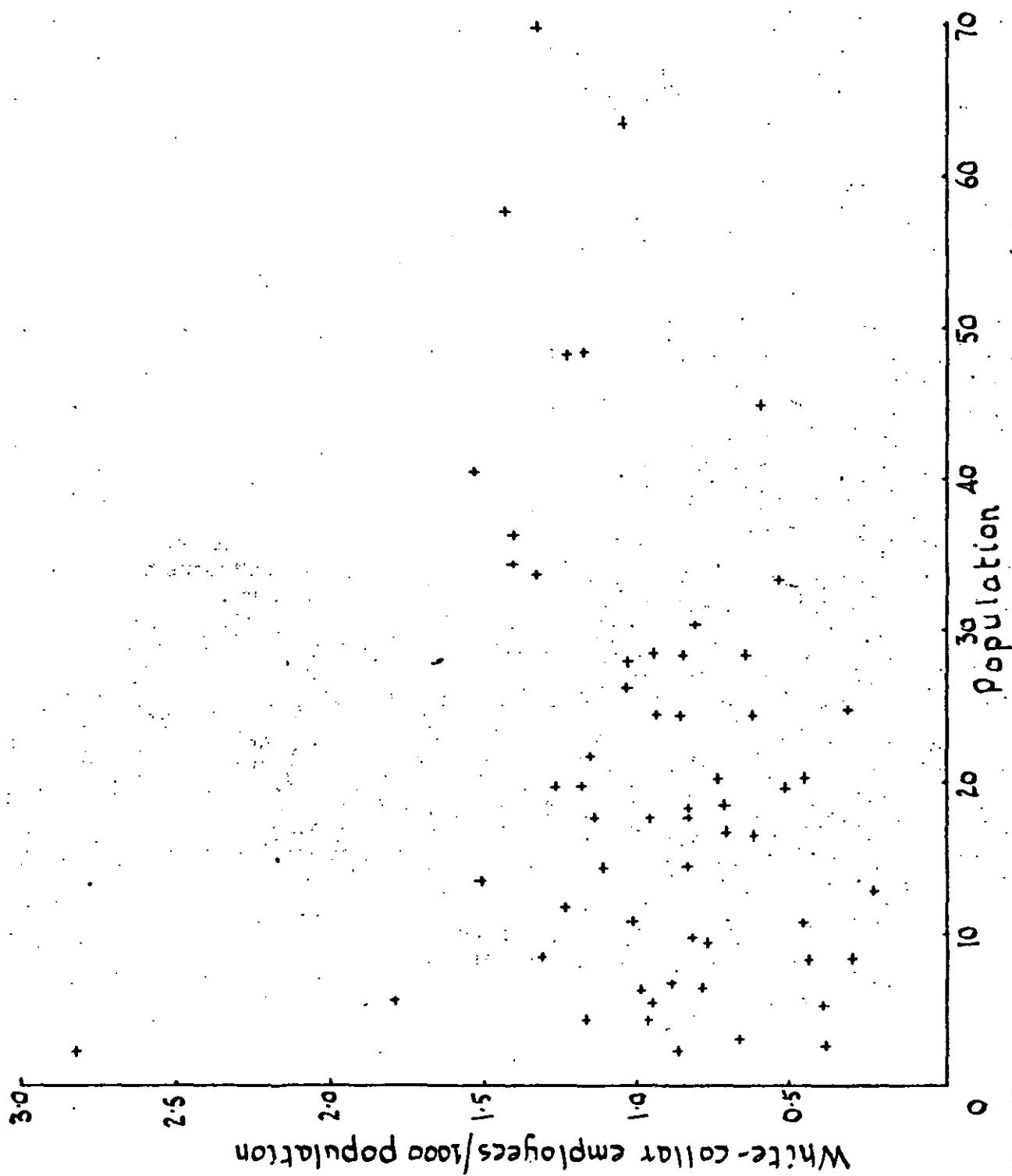


Fig. 3 Ratio of white-collar employees/1000 population for each of 58 pre-LGR urban authorities

Figure 3

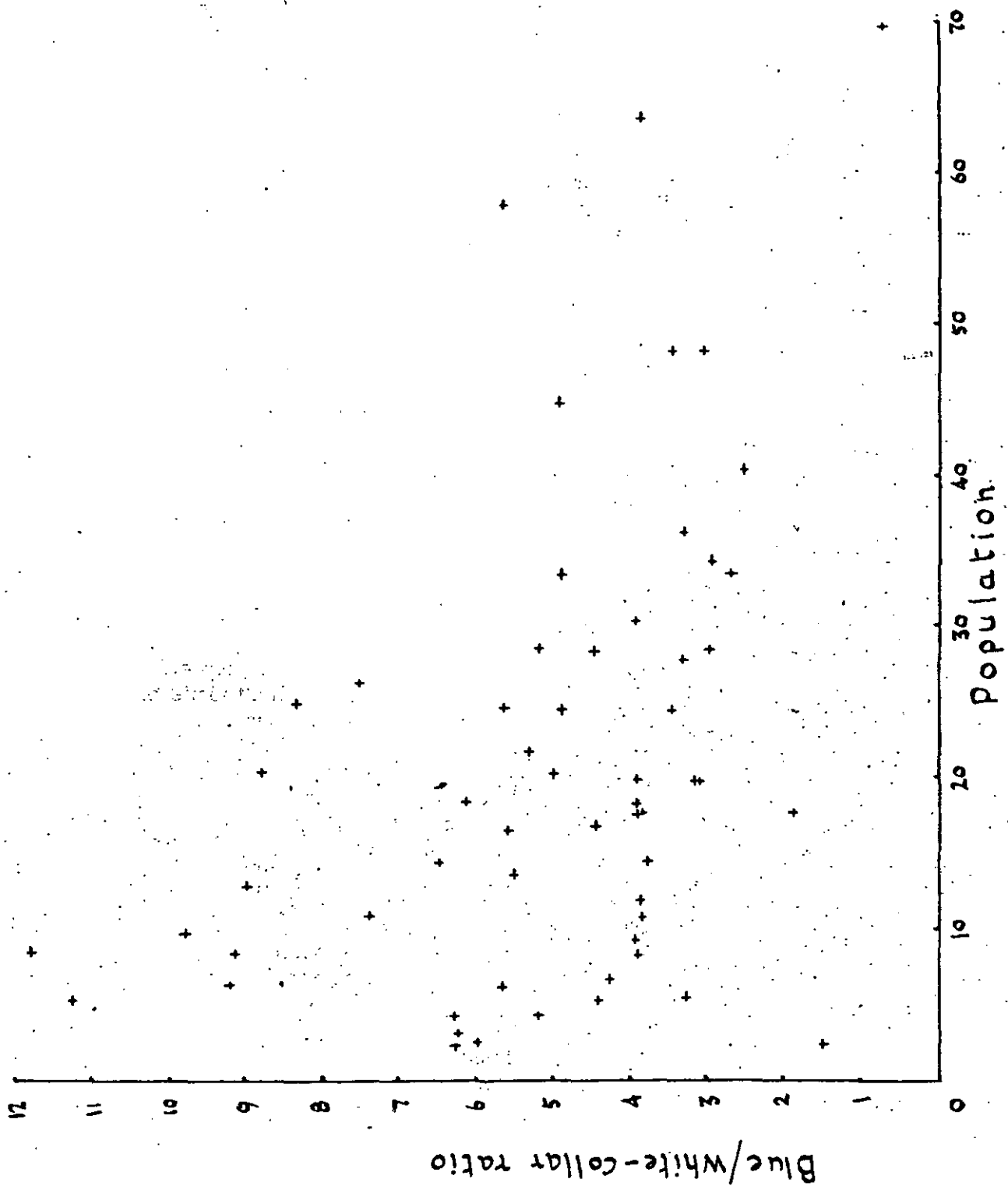


Fig.4 Ratio of blue-collar employees to white-collar employees for each of 58 pre-L62 urban authorities.

Figure 4

BLUE COLLAR EMPLOYEES/1,000 Pop.			CORRESPONDING WHITE COLLAR EMPLOYEES/1,000 Pop.	
Descending Order	Ratio	Quartile	Ratio	Quartile
1	8.29	Top	1.51	Top
2	8.13	"	1.44	"
3	7.80	"	1.04	Middle
4	7.25	"	0.82	"
5	7.13	"	0.78	"
6	6.15	"	1.16	"
7	6.10	"	0.96	"
8	6.02	"	1.16	"
9	5.79	"	1.78	Top
10	5.57	"	0.98	Middle
11	5.41	"	0.86	"
12	5.38	"	0.84	"
13	5.30	"	0.94	"
14	5.11	"	1.31	Top
15	4.74	"	1.24	"
16	4.68	Middle	1.18	"
17	4.68	"	1.41	"
18	4.38	"	1.14	Middle
19	4.38	"	0.39	Bottom
20	4.36	"	0.71	Middle
21	4.23	"	0.95	"
22	4.22	"	1.42	Top
23	4.20	"	1.23	"
24	4.17	"	0.67	Bottom
25	4.16	"	1.11	Middle
26	4.15	"	0.95	"
27	4.13	"	2.83	Top
28	4.08	"	1.05	Middle
29	4.01	"	1.26	Top
30	3.93	"	0.43	Bottom
31	3.91	"	0.45	"
32	3.90	"	1.54	Top
33	3.84	"	1.01	Middle
34	3.74	"	0.88	"
35	3.71	"	0.74	"
36	3.64	"	1.34	Top
37	3.63	"	1.18	"
38	3.55	"	0.30	Bottom
39	3.50	"	1.04	Middle
40	3.41	"	0.46	Bottom
41	3.39	"	0.61	"
42	3.38	"	0.65	"
43	3.27	"	0.83	Middle
44	3.22	Bottom	0.84	"
45	3.14	"	0.81	"
46	3.13	"	0.71	"
47	3.01	"	0.77	"
48	3.00	"	0.62	Bottom
49	2.98	"	0.86	Middle
50	2.96	"	0.60	Bottom
51	2.70	"	0.32	"
52	2.66	"	0.54	"
53	2.54	"	0.85	Middle
54	2.36	"	0.39	Bottom
55	2.09	"	0.23	"
56	1.75	"	0.96	Middle
57	1.60	"	0.51	Bottom
58	1.00	"	1.33	Top

TABLE 7. Employee Ratios (Pre-LGR Urban Authorities)

5 had white-collar ratios in the top quartile, and 10 had them in the middle. Of the 28 authorities with blue-collar ratios in the middle, 9 had white-collar ratios in the top quartile, 11 had them in the middle, and 8 had them in the bottom quartile.

Of the 15 authorities with blue-collar ratios in the bottom quartile, one had its white-collar ratio in the top quartile, 7 had them in the middle, and 7 had them in the bottom quartile. 23 authorities (40%) had blue and white-collar ratios in the same quartile. These results are shown diagrammatically in Figure 9, on page 76.

From an inspection of Figure 9, it will be seen that in only one authority does the blue-collar ratio and the white-collar ratio occur in widely differing quartiles; in all the other 57 cases, the different ratios fall into adjoining quartiles.

- (iv) Data for the post-LGR East Midland local authorities technical services departments are given in Table 40, Appendix 10. Employee ratios for the departments of the 31 District authorities are given in Table 41, Appendix 10. The ratios shown in Table 41 have been abstracted and plotted in Figures 5 to 8.

Figure 5, page 70, shows the ratio: total employees/1,000 population, plotted for each of the Districts. If each department exercises the same duties, and to the same standards, points which fall nearer the x axis show greater productivity.

Figure 6, page 71, shows the ratio: blue-collar employees/1,000 population, plotted for 29 of the Districts. If each department exercises the same duties, and to the same standards, points which fall nearer to the x axis show greater productivity.

Figure 7, page 72, shows the ratio: white-collar employees/1,000 population for each of the Districts. If each department exercises the same duties, and to the same standards, points which fall nearer to the x axis show greater productivity.

Figure 8, page 73, shows the ratio: blue-collar employees/white-collar employees plotted for 29 of the Districts.

If all the white-collar employees are directly associated with the blue-collar work (e.g. in planning and control of work), then a smaller ratio (to a limit which has not been established) suggests more planning and control of work, and (hopefully) greater productivity. Thus the points which fall nearer to the x axis suggest greater productivity.

- (v) The blue, and white-collar employee ratios for 29 Districts technical services departments are given in descending order in Table 8, page 74.

text continues on page 74

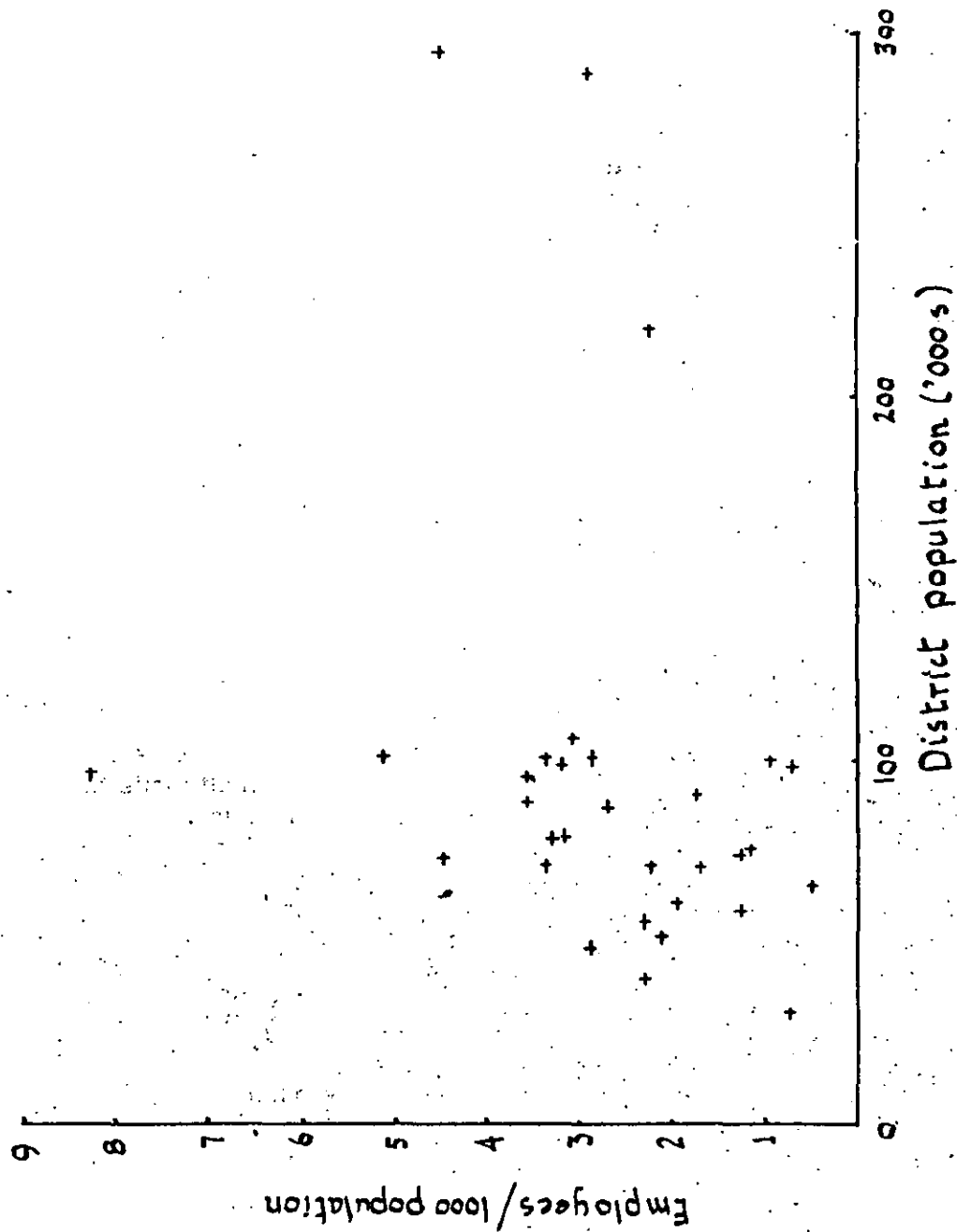


Figure 5. Ratio of total employees/1000 population in each of 31 post-LGR Districts

Figure 5

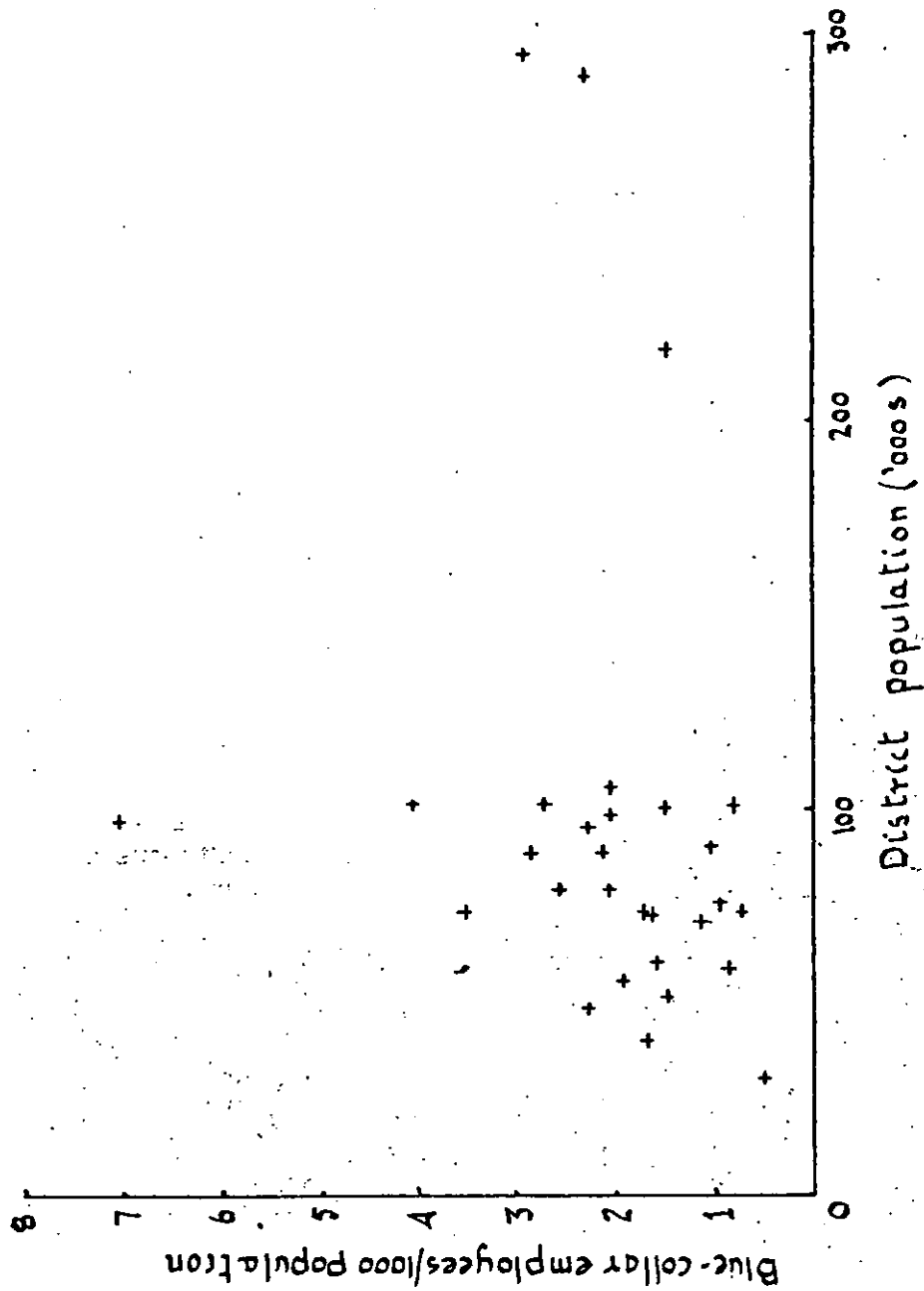


Figure 6. Ratio of blue-collar employees/1000 population in each of 29 post-LGR Districts.

Figure 6.

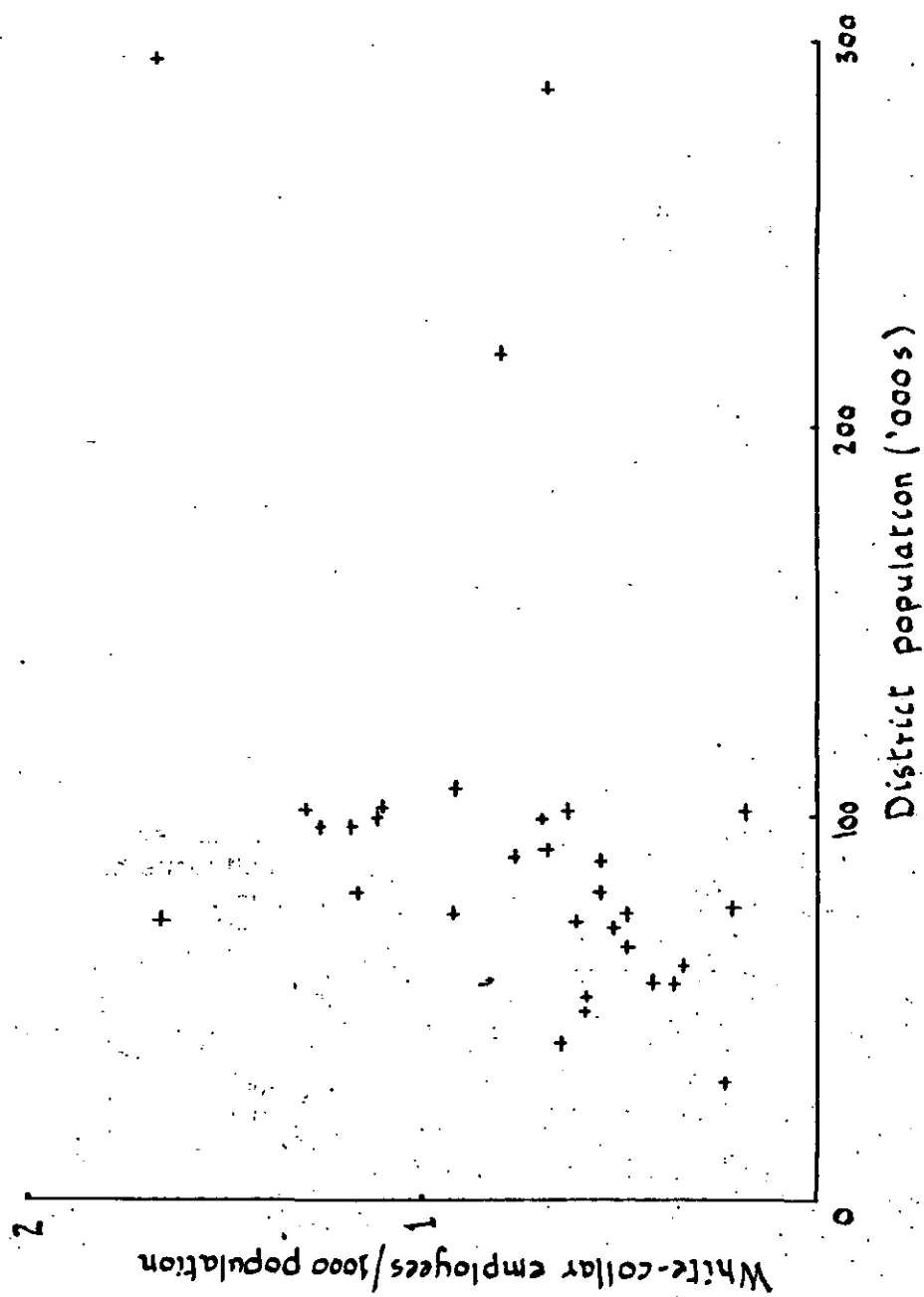


Figure 7. Ratio of white-collar employees/1000 population in each of 31 post-LGR Districts.

Figure 7.

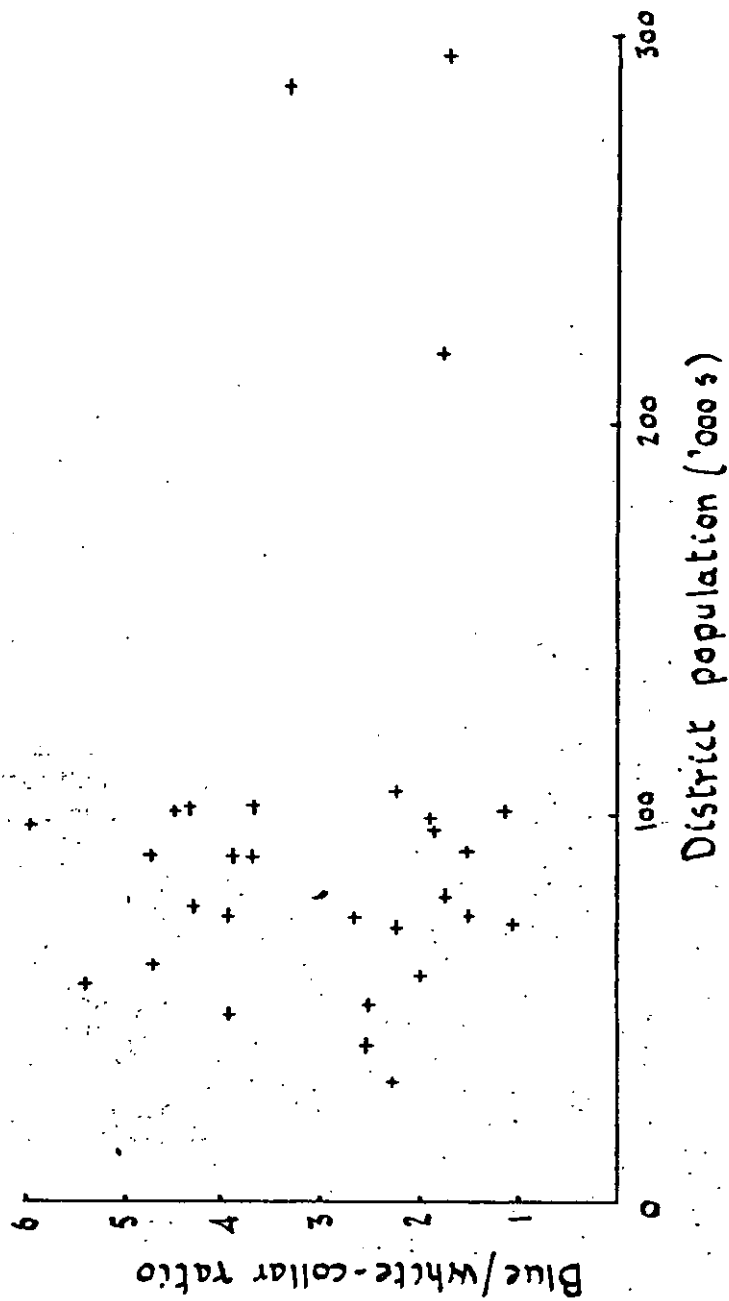


Figure 8. Ratio of blue-collar to white-collar employees
for each of 29 post-LGR Districts

Figure 8.

L.A. Code	Local Authority	FULL TIME BLUE COLLAR EMPLOYEES/1,000 POP.		CORRESPONDING FULL TIME WHITE COLLAR EMPLOYEES/1,000 POP.	
		Ratio	Quartile	Ratio	Quartile
G		7.06	Top	1.18	Top
H		4.05	"	1.10	Middle
M		3.52	"	0.92	"
A		2.88	"	1.68	Top
L		2.82	"	0.76	Middle
N		2.74	"	0.63	"
Q		2.60	"	0.55	"
E		2.30	Middle	1.26	Top
C		2.29	"	0.69	Middle
W		2.29	"	0.59	"
P		2.14	"	0.55	"
J		2.08	"	1.17	Top
KK		2.08	"	1.11	"
I		2.08	"	0.92	Middle
BB		1.92	"	0.36	Bottom
F		1.70	"	1.66	Top
X		1.67	"	0.65	Middle
R		1.61	"	0.61	"
Z		1.60	"	0.34	Bottom
D		1.52	"	1.30	Top
AA		1.51	"	0.59	Middle
B		1.44	"	0.80	Middle
S		1.17	Bottom	0.52	Middle
O		1.07	"	0.69	Middle
DD		0.95	"	0.22	Bottom
Y		0.84	"	0.42	"
CC		0.80	"	0.18	"
T		0.73	"	0.48	"
EE		0.53	"	0.23	"

TABLE 8. Full-time Employees ratios in descending order
Post-LGR Districts

The highest full-time blue-collar employee ratio per 1,000 population shown in Table 41, page 241, is 7.06, and the lowest is 0.53.

The highest full-time white-collar employee ratio per 1,000 population shown in Table 41 is 1.68 and the lowest is 0.18.

Two of these authorities have no blue-collar employees in the technical services departments and have therefore been discarded for the purpose of this particular analysis.

(vi) Examining the relationship between ratios for each authority as before,* it was found that of the 7 authorities with blue-collar ratios in the top quartile, 2 had white-collar ratios in the top quartile, and 5 had them in the middle.

Of the 15 authorities with blue-collar ratios in the middle, 5 had white-collar ratios in the top quartile, 8 had them in the middle, and 2 had them in the bottom quartile.

Of the 7 authorities with blue-collar ratios in the bottom quartile, 2 had white-collar ratios in the middle, and 5 had them in the bottom quartile.

Fifteen authorities (52%) had blue and white-collar ratios in the same quartile.

From an inspection of Figure 10 it will be seen that all these authorities have blue and white-collar ratios in either the same quartile, or in an adjoining one.

52% of these post-LGR Districts have blue and white-collar ratios in the same quartile compared with 40% of the pre-LGR 'urban' authorities.

* The purpose of the following discussion is to highlight differences and similarities in the employment policies of Local authorities for white-collar employees vis-a-vis those for blue-collar employees in post-LGR Districts.

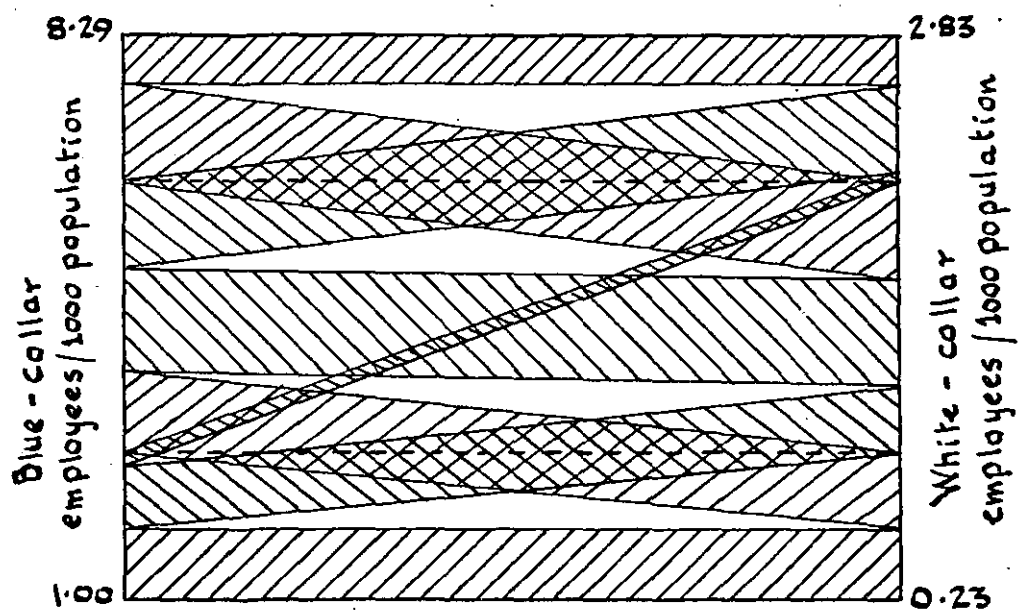


Figure 9. Diagrammatic representation of Table 7.

Employee ratios (pre-LAR urban authorities)

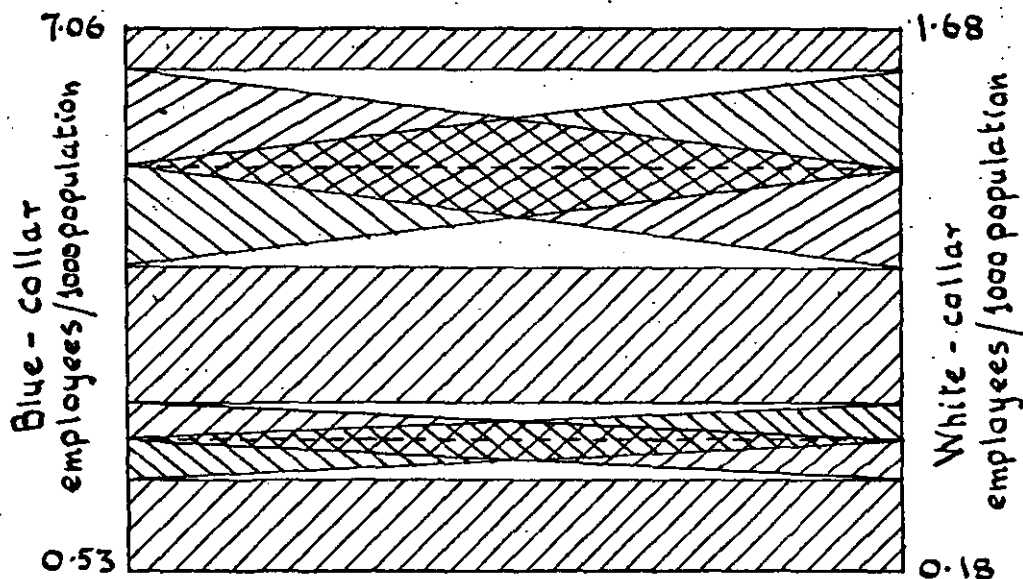


Figure 10. Diagrammatic representation of Table 8.

Employee ratios (post-LAR districts)

(vii) Conclusions

- (i) The range, and mix of functions will have an effect on employee ratios, but if the same functions are exercised by a department, and to the same standards, a smaller workforce suggests greater efficiency^{*} than does a larger one.
- (ii) It is expected that departments with a reasonable level of white-collar work on planning and control would be more efficient, and thus departments with a low blue-collar/white-collar ratio (down to a limit not yet established) would be more efficient than one with a high blue/white ratio (vide para 3.4).

2.8 Application of Employee Ratios

- (i) It is hypothesised that it would be useful to be able to classify local authorities by means of the ratios of the number of full-time blue-collar employees per 1,000 population, and by the number of full-time white-collar employees per 1,000 population in each authority.

Different ratios are likely to represent different levels of service. For example, a high ratio of blue-collar employees per 1,000 population may represent an authority which carried out much work by direct labour compared to the other authorities. Such a ratio may also show that work is executed to a higher standard than in other authorities. Lists of possible causes and effects of the four extreme ratios, i.e. high blue, low blue, high white, and low white, are given in Figure 11, the Cardinal Points diagram.

- (ii) Employee ratios for post-LGR East Midland authorities are given in Table 41, Appendix 10.

The highest ratio of blue-collar employees per 1,000 population is 7.06, and the lowest is 0.53.

The highest ratio of white-collar employees per 1,000 population

* vide paragraph 3.4 (i) page 102 for a ⁷⁷ definition of efficiency.

The following suggested "causes and effects" are the result of logical analysis. No research was carried out to validate what are in effect hypotheses.

<p><u>Highest blue-collar employees/1000 population</u></p> <p><u>Causes</u></p> <ol style="list-style-type: none"> 1) Policy on standards and quality of service 2) Bigger range of direct labour duties 3) More work done by direct labour, less by contractors 4) More blue-collar supervisors, fewer white <p><u>Effects</u></p> <ol style="list-style-type: none"> 1) Higher quality blue-collar work 2) More frequent (or prompt) blue-collar service 3) Less efficient blue-collar work 	<p><u>Highest white-collar employees/1000 population</u></p> <p><u>Causes</u></p> <ol style="list-style-type: none"> 1) Policy on standards and quality of service 2) Bigger range of all duties 3) More direct labour staff work less by consultants 4) More white-collar supervisors, fewer blue 5) More planning and control of direct labour blue-collar employees <p><u>Effects</u></p> <ol style="list-style-type: none"> 1) Higher quality white-collar work 2) Higher quality blue-collar work 3) Higher quality contractors work 4) More frequent (or prompt) white-collar service 5) More frequent (or prompt) blue-collar service 6) More frequent (or prompt) contractors service 7) Less efficient white-collar work
<p><u>Causes</u></p> <ol style="list-style-type: none"> 1) Policy on standards and quality of service 2) Smaller range of direct labour duties 3) Less work done by direct labour, more by contractors 4) Fewer blue-collar supervisors, more white <p><u>Effects</u></p> <ol style="list-style-type: none"> 1) Lower quality of blue-collar work 2) Less frequent (or prompt) blue-collar service 3) More efficient blue-collar work 4) More work done by other departments <p><u>Lowest blue-collar employees/1000 population</u></p>	<p><u>Causes</u></p> <ol style="list-style-type: none"> 1) Policy on standards and quality of service 2) Smaller range of duties 3) Less direct labour staff work, more by consultants 4) Fewer white-collar supervisors, more blue 5) Less planning and control of direct labour blue-collar employees <p><u>Effects</u></p> <ol style="list-style-type: none"> 1) Lower quality of white-collar work 2) Lower quality of blue-collar work 3) Lower quality contractors work 4) Less frequent (or prompt) white-collar service 5) Less frequent (or prompt) blue-collar service 6) Less frequent (or prompt) contractors service 7) More efficient white-collar work 8) More work done by other departments <p><u>Lowest white-collar employees/1000 population</u></p>

Figure 11. Cardinal points diagram

is 1.68, and the lowest is 0.18.

These 'extreme' ratios which are limits for this sample, ^{Could probably} ~~may~~ be regarded as near limits for the country as a whole.

It is possible to calculate these employee ratios for any local authority, and by referring to these limits to ascertain whether the figure is high or low in relationship to these limits.

It would then be possible to refer to the Cardinal Points diagram (Figure 11) with a view to identifying possible causes which give rise to the ratio, and its possible effects.

(iii) It would be useful to link the blue and white collar ratios more closely with the 'cardinal points' diagram, and to devise a system for classifying local authorities through a combination of the ratios and the diagram.

First, scales need to be devised for both the blue and the white-collar ratios. In the long run it may be desirable to discard the extreme values for each series of ratios, but for the time being they are included until data from more authorities are available.

Until more data are available, scales have been devised on the basis of allocating the same number of ratios to each division on the scales for both blue-collar, and white-collar ratios.

A nine-point scale has been used, 1 being the lowest ratio, and 9 being the highest.

These scales are shown in Table 9.

The application of these scales to either side of the 'cardinal points' diagram to produce the Employee Profile Grid is shown in Figure 12.

Scale	Full-time blue collar employees/1,000 population	Full-time white collar employees/1,000 population	Scale
9	7.06	1.68	9
8	2.85	1.22	8
7	2.30	1.10	7
6	2.11	0.78	6
5	1.92 (median)	0.65 (median)	5
4	1.60	0.59	4
3	1.44	0.52	3
2	0.90	0.35	2
1	0.53	0.18	1

TABLE 9. Scales derived from ratios.

- (iv) Any authority can calculate its ratios of full-time employees engaged in technical services departments and classify itself by means of these ratios by reference to the Employee Profile Grid (Figure 12), as say a 1:1 authority, or a 9:9 authority.

It may also identify possible causes, and effects as listed in the Grid, and consider how relevant these are to that particular authority.

Thus a 1:1 authority has lowest blue-collar, and lowest white-collar employees; a 9:9 authority has highest blue-collar, and highest white-collar employees; while a 5:5 authority is in the middle range for both. In practice, most authorities will have different points on the scale for each ratio.

The post-IGR East Midland Districts technical services departments have been classified from the Employee Profile Grid in this manner and are given in Table 10.

- (v) If the number of employees per 1,000 population is a measure of productivity (bearing in mind the range of duties, and level of service), and if the proportion of white-collar employees to blue-collar employees is a measure of planning and control, then a combination of these two ratios should be a measure of effectiveness. For example, a high number of employees coupled with a high blue/white

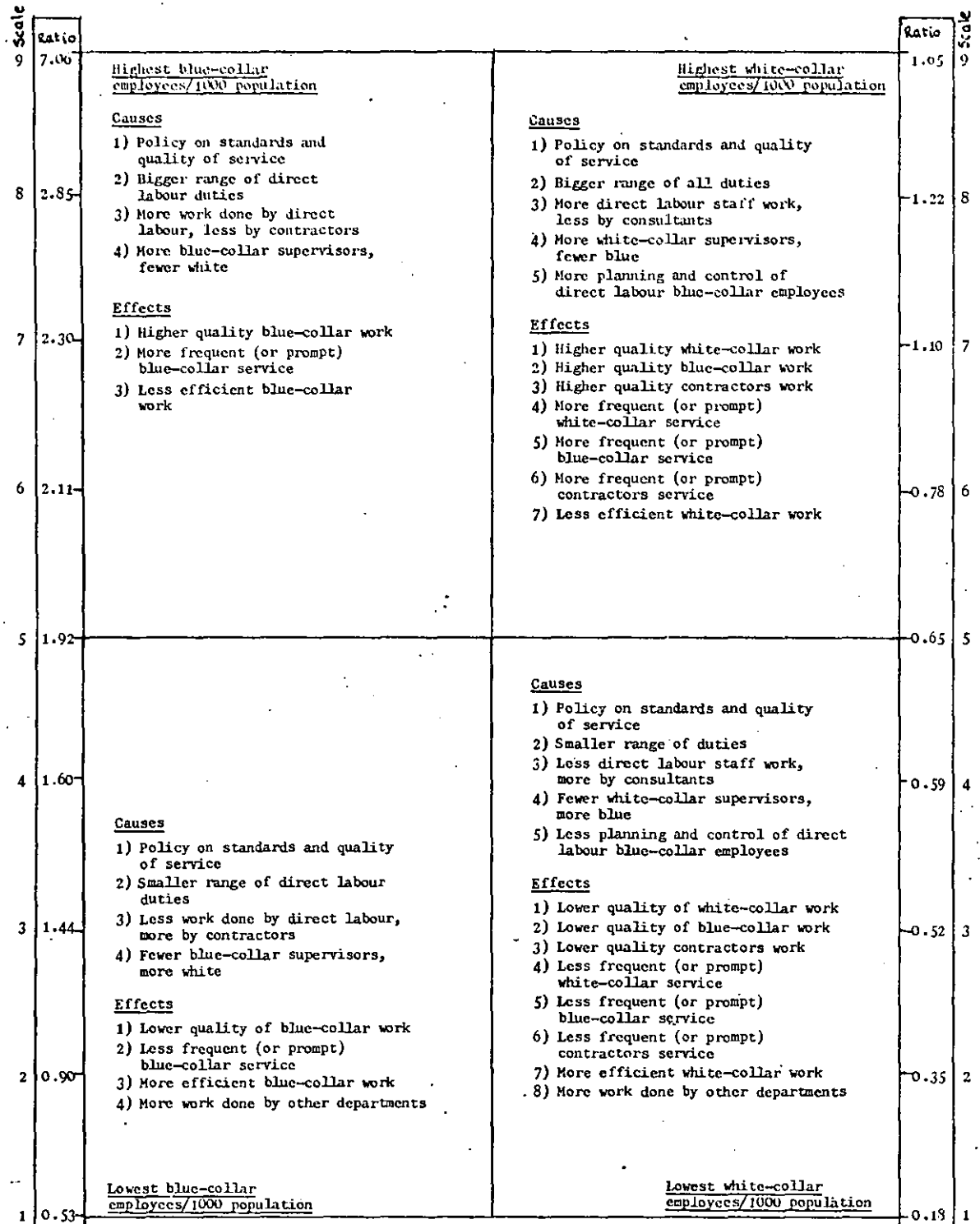


Figure 12. Employee profile grid

ratio would suggest a surplus of blue-collar employees, and little planning and control.

Conversely, if all the white-collar employees were directly associated with blue-collar work, a low number of employees coupled with a low blue/white ratio would suggest too many white-collar employees. The relationship between total employees/1,000 pop. and the blue/white collar ratio for the 29 East Midland Districts are shown in Figure 13.

L.A. Code letter	Descending Order of F/T Blue Ratio	Classification Blue:White	For inter- pretation of the classification see Employee Profile Grid, Figure 12.
G	1	9 : 7	
H	2	8 : 7	
M	3	8 : 6	
A	4	8 : 9	
L	5	7 : 5	
N	6	7 : 4	
Q	7	7 : 3	
E	8	7 : 8	
C	9	6 : 5	
W	10	6 : 4	
P	11	6 : 3	
J	12	5 : 7	
KK	13	5 : 7	
I	14	5 : 6	
BB	15	5 : 2	
F	16	4 : 8	
X	17	4 : 5	
R	18	4 : 4	
Z	19	4 : 1	
D	20	3 : 8	
AA	21	3 : 4	
B	22	3 : 6	
S	23	2 : 3	
O	24	2 : 5	
DD	25	2 : 1	
Y	26	1 : 2	
CC	27	1 : 1	
T	28	1 : 2	
EE	29	1 : 1	

TABLE 10. Classification of post-LGR Districts technical services departments by reference to the Employee Profile Grid.

(vi) Peter Drucker (24) says:

"In 1900 the typical manufacturing company in the US spent probably no more than \$5 to \$8 on managerial, technical, and professional personnel for every \$100 in direct-labour wages.

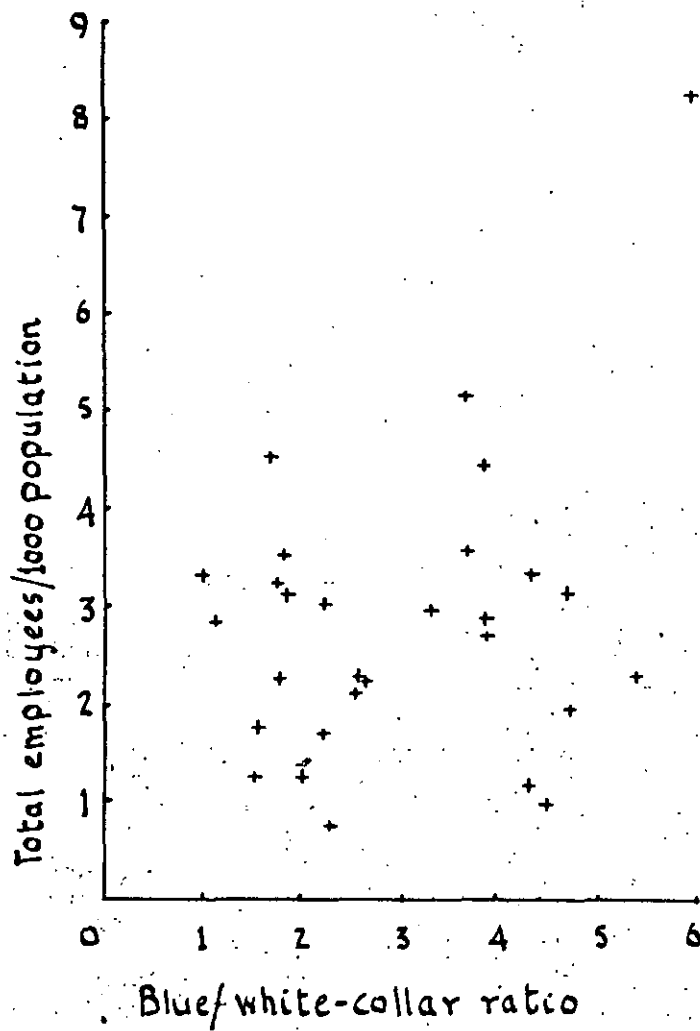


Figure 13 The relationship between total employees/1000 population and the blue-white-collar ratio in each of 29 post-LGR Districts.

"Today there are many manufacturing industries where the two items of expenditure are equal - even though direct-labour wage rates have risen proportionately much faster. "

It was considered therefore that the ratio: $\frac{\text{blue collar workers}}{\text{white collar workers}}$ should be investigated (vide para 3.4, pages 102 and 103).

It is considered that if the same functions are exercised in each local authority, and the same standards are achieved, a smaller blue/white ratio suggests greater efficiency than does a larger one. The blue/white ratios for 104 pre-LGR authorities are shown in Table 39.

On the whole it will be seen from Figure 4 that the authorities with the larger blue/white ratio are the 'smaller' (under 30,000 population) ones.

The main rationale of local government reorganisation was that there were too many small authorities to discharge their functions effectively. This rationale leads to the opinion that the smaller blue/white ratio which is inherent in larger authorities potentially gives more efficient working. Though it is likely that there is a point beyond which larger organisations begin to become less efficient (vide para 3.3).

It seems clear therefore that initially as local government reorganisation would result in larger authorities, it would also lead to lower blue/white ratios. To begin with this may be achieved by the employment of more white-collar workers, and in the long run, to fewer blue-collar workers.

If this reasoning is correct, it would account in part for the increase in the number of employees which followed local government reorganisation.

Conclusions

- (i) It is suggested that the Employee Profile Grid developed above may be useful in classifying authorities by means of employee ratios, thus leading to the development of inter-authority comparisons.
- (ii) Similarly, the use of employee ratios shown in Figure 13 may lead to a similar development.

2.9 Tendency of Authorities with Similar 'Productivities' to Amalgamate

One of the major guidelines in the Local Government Boundary Report for England No. 1 (November 1972) (25) was population size. For example, the post-LGR authorities were to be not less than 40,000 population, and generally to be in the range 75 - 100,000. The new Counties and Districts in the East Midlands are shown on the map (page 12A) including the pre-reorganisation authorities.

Key to Variables

Column	1	total employees
	2	number of blue-collar employees
	3	" " white- " "
	4	blue/white ratio
	10	population
	11	type of authority

The results are given in Table 11 and are tabulated for each run in order of significance.

Reference to Table 11 shows that there is a significant difference in grouping between the 'actual' post-LGR districts (based on pre-LGR data), and those new districts which would have resulted from combining trios of pre-LGR authorities purely at random. The reason for this conclusion is that the figures show (vide Table 12) that the amount of variance explained is highest for the 32 post-LGR districts which have

been produced by merging trios of pre-LGR authorities randomly, and is lowest for the deliberate grouping of those with similar 'productivity'. 'Productivity' being defined as the total employees/1000 population. The 'actual' post-LGR districts are closer to the latter (similar productivity) than to the former (randomly merged trios).

Run	Sample Size	Dep. Variable Col.	Other Variables Col.	Sign of Coeff.	r	Approx. P	Signif.	
E1	33	1	ALL	+	0.96	$0.7 \cdot 10^{-16}$	****	33 predicted districts
			10	+	0.94	$0.2 \cdot 10^{-15}$	****	
			11	-	0.84	$0.8 \cdot 10^{-9}$	****	
E2	96	1	ALL	+	0.97	$0.7 \cdot 10^{-55}$	****	96 pre-LGR authorities
			10	+	0.95	$0.8 \cdot 10^{-47}$	****	
			11	-	0.77	$0.5 \cdot 10^{-19}$	****	

TABLE 11. Analysis of data for pre- and post-LGR local authorities.

In the case of the grouping in which the highest amount of variance is explained, these authorities must be nearer the mean, and therefore be similar to one another. In the case of a grouping where less of the variance is explained, these authorities will be more dispersed about the mean and therefore be less similar to one another. Therefore the combining together of authorities which have similar productivities ("birds of a feather"), whether these are high or low, will result in their being more dispersed about the mean, with less of the variance explained.

Conclusion

There is a significant difference between the 'actual' new local authorities, and those which would have resulted from combining trios of

(continued on page 88)

TYPE	Proportion of variance explained by population and type of authority.	Probability of happening by pure chance (all reduced to a sample size = 32)	Row 3 = 1.00
1 Old '96' Authority: (2, '5' & 6 only)	.9348 run E. 2	.641 10^{-17}	
2 32 'new' authorities: each merged RANDOMLY FROM 3 OLD AUTHORITIES	.944 Note: more homogeneous than previous old authorities. (mean of three runs)	circa .5 10^{-18} →	514
3 ACTUAL 33 NEW AUTHORITIES	.9159 run E. 1	.257 10^{-15} →	1.00
4 Result obtained by combining the most 'productive' three old authorities etc.	.9066	.117 10^{-14} →	0.22

TABLE 12. Summary of Results on the "Grouping-together-of-Birds-of-a-Feather" Amongst 33 New Local Authorities.

the old local authorities purely at random. Local authorities which are significantly similar have been joined together by LGR. Thus the differences in staffing between post-LGR authorities are more marked than those between pre-LGR authorities.

3.1 The Organisational Pyramid(i) Pre-LGR Authorities

The technical departments of these authorities were examined to see what patterns of supervision and spans of control were in use at the upper levels.* The basic data are tabulated in Appendix 10, Table 38. In each case there is one head of department, and the numbers in second tiers are as follows:

							Totals	Average
No. in 2nd tier	1	2	3	4	5	6	133	1.24
No. of departments	93	9	1	2	1	1	107	—

Although 93 chief officers show a span of control of one, this is more likely to be the result of the way they view their department than to represent reality. As most departments have one deputy, he is regarded as the only 'second tier' man, whereas it was intended by the writer that everyone reporting to the chief officer would be regarded as 'second tier' but it is now considered unlikely that respondents regarded it as such. Nevertheless the results suggest that chief officers have regarded their departments as traditional hierarchies and not brought management thought to bear on how the organisation actually works in practice.

It should be noted too that many of these departments are small, 71 having 20 or fewer white collar employees. The average span of control is 1.24, but this is likely to be inaccurate for the reasons stated above.

The numbers in the third tier are as follows:

								Totals	Average
No. in third tier	0	1	2	3	4	5	6	264	2.78
No. of departments	8	8	26	25	16	7	5	95	—

Sixty-seven out of the 95 2nd tier people have a span of control of 3 or less, which is well below the 'ideal' number of 5 or 6. The average span of control at 2nd tier level = $\frac{264}{133} = 1.98$.

Superintendents of blue collar employees have traditionally been closely associated with the chief officer in the medium size and smaller authorities.

The numbers of superintendents in departments are as follows:

										Totals	Average
No. of superintendents	0	1	2	3	4	5	6	7	8	188	2
No. of departments	13	33	19	12	10	3	3	0	1	94	-

Almost half the departments have one superintendent or more, which reflects the small size of the authorities, and their work forces. The average number of superintendents is 2.

(ii) Post-LGR Authorities

Data for twenty-one authorities are given in Table 13. In each case there is one head of department, and the numbers in the second tiers are as follows:

									Totals	Average
No. in 2nd tier	1	2	3	4	5	6	7	8	89	4.23
No. of departments	1	3	7	3	1	1	2	3	21	—

These post-LGR data are more likely to reflect reality, and this is partly due to the fact that in the later questionnaire, 'second tier' was defined.

The chief officers' average span of control is 4.23.

The numbers in third tiers are as follows:

																Totals	Average
No. in 3rd tier	3	4	5	6	7	8	9	12	13	14	15	23	25	29		241	11.48
No. of departments	2	2	1	1	1	2	1	2	3	1	2	1	1	1		21	—

The average span of control of 2nd tier people = $\frac{241}{89} = 2.71$. In addition to the data relating to the top three tiers, there is also the total number of blue and white collar workers, as shown in Table 40, Appendix 10.

The numbers of employees for whom (on average) each employee in the top three tiers of management are responsible in each authority are given in Table 13. These numbers have been derived by calculating the numbers of total employees below each particular tier, in each authority, and dividing those numbers by the number of employees at the respective tier.

Each employee is counted three times, i.e. as a responsibility of 1st tier, as a responsibility of 2nd tier, and as a responsibility of 3rd tier. There is a wide range of numbers of people for whom each employee is, on average, 'responsible'.

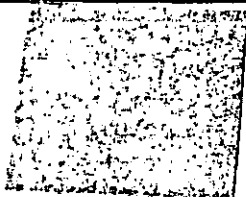
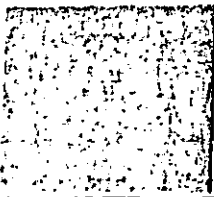
L.A. Code	AUTHORITY	NUMBERS OF EMPLOYEES				AVERAGE NO. OF EMPLOYEES RESPONSIBLE TO:		
		T i e r			Total	T i e r		
		1st	2nd	3rd		1st	2nd	3rd
E		1	8	12	340	339	41	27
B		1	3	8	488	487	161	59
D		1	3	7	282	281	93	39
O		1	2	4	158	157	77	38
Z		1	2	3	120	119	58	38
U		1	7	29	37	36	4	1
GG		1	5	13	792	791	157	59
DD		1	4	4	90	89	24	20
BB		1	4	25	128	127	31	4
C		1	2	9	867	856	427	94
AA)		1	3	6	89	88	28	13
AA)		1	3	3	21	20	6	5
EE		1	3	8	23	22	6	1
W		1	4	13	142	141	34	10
Y		1	1	12	72	71	70	5
L		1	3	5	315	314	103	61
F		1	6	13	243	242	39	17
JJ		1	8	23	464	463	57	19
H		1	8	15	428	427	52	27
G		1	7	15	797	796	113	52
CC		1	3	14	99	98	32	6
Totals:		21	89	241				

TABLE 13. Number of Employees for whom each Member of Staff (top 3 tiers) is, on average, responsible in post-LGR Authorities.

The size of the pyramid, i.e. the total number of employees, is known. The shape and size of the top three tiers in the pyramid - see Table 13 - is known. Therefore the number of employees below 3rd tier in each authority is known. Thus by making assumptions about the numbers of tiers (levels) below 3rd tier, an average span of control for each employee can be established.

Alternatively, by assuming a uniform span of control for each employee below 3rd tier, the number of tiers (levels) below 3rd can be calculated.

It should be noted, however, that span of control is unlikely to be uniform throughout an organisation. Both junior and top managements have a greater number of immediate subordinates than middle-management, according to work done by Mr. M.J. Sargeant. (vide page 94).

Let K = number of employees in 3rd tier

N = " " tiers below 3rd

R = spans of control

$$\begin{aligned} \text{TE (Total employees less those in first 3 tiers)} &= KR^1 + KR^2 + KR^3 \dots\dots KR^N \\ &= K(R^1 + R^2 + R^3 \dots\dots R^N) \end{aligned}$$

$$\text{TE(R-1)} = K(R^{N+1} - R)$$

$$\frac{\text{TE}}{K} = \frac{(R^{N+1} - R)}{R - 1}$$

The Results are given in Table 14.

Span of control	No. of tiers below 3rd			
	1	2	3	4
	at 4th	at 5th	at 6th	at 7th
3	3	12	39	120
4	4	20	84	340
5	5	30	155	780
6	6	42	258	
7	7	56		
8	8	72		

TABLE 14. Number of Employees below top 3 tiers for given Spans of
Control

Example

L.A. Code JJ has 464 employees in total including 32 in the first 3 tiers

$$\frac{464 - 32}{23(\text{No. in 3rd tier})} = 19$$

By looking up 19 in Table 14, it is found that a span of control of 4 will result in 2 more tiers, making 5 in all. There would be $23 \times 4 = 92$ in 4th tier, and $92 \times 4 = 368$ in the 5th tier.

$92 + 368 = 460$ which is 28 more than the actual 432 employees below 3rd tier.

Table 15 shows the number of employees below third tier in each authority, and the number of tiers below 3rd shown therein have been calculated by reference to Table 14.

AUTHORITY	L.A. Code	Number of employees below 3rd tier	Number of tiers below 3rd
	C	94	2 - 3
	L	61	2 - 3
	GG	59	2 - 3
	B	59	2 - 3
	G	52	2 - 3
	D	39	2
	O	38	2
	Z	38	2
	H	27	2
	E	27	2
	DD	20	2
	JJ	19	2
	F	17	1 - 2
	W	10	1
	AA	10	1
	CC	6	1
	Y	5	1
	BB	4	1
	U	1	0
	EE	-1	0

TABLE 15. Number of tiers below third.

Example

L.A. Code JJ has 464 employees, and from Table 15 it has 5 tiers:

Tier	No. of Employees	Span of Control
1	1	8
2	8	3
3	23	4
4	92	4
5	368	-
Totals: 5	492	-

Example 2

L.A. Code D has 282 employees, and from Table 15 it has 5 tiers:

Tier	No. of Employees	Span of Control
1	1	3
2	3	2
3	7	6
4	42	6
5	252	-
Totals: 5	305	-

It is suggested that most chief officers would consider that there were several more tiers than are shown in these analyses. It may be that each department should be re-examined to see whether these analyses have any value in guiding thoughts on organisation (including responsibility and pay). It should be borne in mind that the spans of control shown here are the direct ones.

They do not include the important (and time-consuming) contacts with e.g. peer groups (chief officers' management team, chief technical officers' associations), and departmental management team, with chairmen, or with committees.

N.B.: Sargeant M.J. (after Stewart, R., Managers and their jobs) in private correspondence, showed that both top and junior management have a greater number of immediate subordinates than does middle management.

(iii) Conclusions

- (a) Average spans of control for the top tiers of both pre-LGR and post-LGR authorities are very small.
- (b) The theoretical number of levels of authority may be substantially

fewer than those used in practice.

3.2 Functions in Post-LGR Districts

Analysis of ALGES Data

A questionnaire was distributed by the Association of Local Government Engineers and Surveyors (ALGES) to chief officers of post-LGR district councils in February 1974 (a copy is reproduced in Appendix 11). Among other things the circular sought information on the functions for which chief officers were responsible. They were invited to say whether they were responsible for seven specified functions, namely, town planning, architecture, engineering, building control, building maintenance, parks, etc., and refuse collection etc. Respondents were asked to complete a section for 'other major responsibilities'. The items included in this section are self-selected by respondents, and responsibilities itemised therein may have been assumed by other respondents to be included in one or other of the seven listed functions.

Eleven pages of data from 154 district authorities (four of them being metropolitan districts) were supplied to the writer by ALGES. It was desired to see if there were any significant differences between succeeding pages of the data supplied by ALGES. The authorities had been tabulated in order of increasing population from the smallest (24,060) to the largest (746,000).

A summary of each page of data is given in Table 16.

It was decided to use the Chi square test of significance and it was first necessary to see whether any of the projected frequencies fell below 5, because if so, the conclusions on significance would be in doubt. This analysis was first applied to the 'self-selected' functions $\chi^2 = 7.29$; there are 10 degrees of freedom. This result is not significant, or barely so, since it could have occurred by chance more than 5% of the time.

Page No.	No. of L.A.s	Popula- tion Range	Nos. of Chief Officers who have each of the following functions:-																
			Planning	Archi- ture	Engg.	Building Control	Building Maint'ce	Parks etc.	Refuse Coll. etc.	Direct Labour	Harbours	Env. Health	Valua- tion	Work Study	Enter- tainments	Pass. Trans.	Race- courses	Air- port	TOTALS
1	14	24-52,000	3	12	14	9	13	14	8	0	1	1	0	1	0	0	0	0	76
2	14	56-69500	7	11	14	11	10	10	6	0	0	1	0	0	0	0	0	0	70
3	14	70-75737	5	12	14	9	11	10	11	0	0	1	1	0	0	0	0	0	74
4	14	76-83720	2	12	14	9	12	12	6	1	0	0	2	2	0	0	0	0	76
5	14	84.5-90700	3	8	14	6	11	11	11	0	0	1	2	2	0	0	0	0	69
6	14	91-95400	5	11	14	7	13	8	10	1	0	0	0	0	0	0	0	0	69
7	14	95.9-102000	4	12	14	8	13	9	9	0	0	0	2	0	1	1	1	0	74
8	14	102.5-108.1	4	8	14	10	13	8	11	0	1	0	1	1	0	0	0	0	71
9	14	109 - 122000	4	10	14	9	9	11	11	0	1	1	1	1	0	1	0	0	73
10	14	123 - 164000	3	6	14	9	10	1	9	1	0	1	0	0	0	1	0	0	55
11	14	165-746000	3	3	13	5	10	4	12	0	0	1	1	0	0	0	0	1	53
TOTALS	154	24 - 746,000	43	105	153	92	125	98	108	3	3	7	10	7	1	3	1	1	760
153 24 - 421,000						124			107										
			Totals 758 Adjusted to remove the D of W, 746,000 pop.																

TABLE 16. Responsibilities of Chief Officers in Districts; summary of data per page.

Page No.	No. of L.A.s	Population Range	Nos. of Chief Officers who have the nos. of functions shown below																Mode	RANGE			Ranking of mean
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Min	Max	Mean	
1	14	24-52,000	0	1	0	2	5	1	5	0	0	0	0	0	0	0	0	0	5/7	2	7	5.43	1
2	14	56-69500			2	3	4	3	2										5	3	7	5	5
3	14	70-75737			3	3	0	4	3	1									6	3	8	5.29	2
4	14	76-83720			2	1	3	6	1	1									6	3	8	5.43	1
5	14	84.5-90700			2	5	1	4	2										4	3	7	4.93	6
6	14	91-95400	1		1	3	3	4	2										6	1	7	4.93	6
7	14	95.9-102000			2	3	3	3	2		1								4/5/6	3	9	5.29	2
8	14	102.5-108.1		1	0	3	4	5	1										6	2	7	5.07	4
9	14	109 - 122000			2	3	4	2	2		1								5	3	9	5.21	3
10	14	123 - 164000	1		4	5	2	2	0										4	1	6	3.93	7
11	14	165-746,000	0	4	2	5	1	0	2	0	0	0	0	0	0	0	0	0	4	2	7	3.92	8
TOTALS	154	24-746,000	2	6	20	36	30	34	22	2	2								4	1	9		

153

24-421,000

5

Totals adjusted to remove the D of W; 746,000 pop.

TABLE 17. Numbers of Chief Officers who have 1 - 16 Functions.

Because of this lack of significance the self-selected functions are omitted from the major analyses. The analysis was now applied to the first seven columns of data (vide Table 16), these being the seven main functions identified in the questionnaire (for safety expected frequencies are specially printed out). Eleven cells were so printed out, the smallest expectation being 2.85873, but eight of the eleven were over 4, and it was therefore considered that the test was not thereby materially invalidated $\chi^2 = 30.2648$ (10 df). This result is significant at 0.1% level.

Thus it is considered that there is no significant difference between the mix of functions in succeeding rows (which equate with population) of data.

Analysis of all 11 sorts of 153 districts, and all 16 functions (758 items)

$\chi^2 = 7.895$. This result is not significant (10 df).

Analysis of all 153 districts, and 7 functions (722 items)

$\chi^2 = 9.3571$. This result is not significant (10 df).

Analysis for 126 districts, and 7 functions (622 items)

$\chi^2 = 0.8282$ which is nearly significant at 99% level (8 df).

For this analysis the 27 larger authorities (i.e. the last 2 lines of the data) were omitted.

Analysis of number of functions per district

This analysis compares the smaller 126 districts (9 lines) with the larger 27 districts (2 lines)

$\chi^2 = 6.76221$ which is significant at 1% level (df = 1).

Therefore the larger authorities in this sample suggest that their chief officers are responsible for fewer functions than those in the smaller authorities (vide Table 17).

There is a significant difference in both architecture, and parks etc., in the authorities whose population exceeds 123,000 compared with

those below that figure. Thus it is less likely that chief officers in the larger authorities in this sample will be responsible for parks, etc., and architecture, than that they will not be so responsible. Apart from this difference, which reflects in the total number of functions for which the chief officer is responsible, the mix of functions undertaken is significantly similar for all chief officers, irrespective of the size of their authority.

Conclusions

- (i) The mix of functions for which a chief technical officer is responsible is significantly similar; however, parks and architecture are significantly different.
- (ii) The larger the local authority, the fewer the functions exercised by the chief officer.

3.3 Effect of Size

It was the stated assumption that larger authorities were both more effective and more efficient than smaller ones which led successive governments to adopt policies for local government reorganisation which would result in larger units. For example, the Conservative government's proposals for reorganisation in February 1971 (26) stated (vide para 2.8 (vi)):

"There are too many authorities and many of them are too small in area and resources to support the operation of services to the standards which people nowadays have the right to expect."

"If local authorities are to provide services effectively and economically, their areas should be large enough in size, population and resources to meet administrative needs, including the maintenance and development of a trained and expert local government service ..."

(i) Number of employees in 'large' and 'small' authorities

This analysis is in respect of 49 'urban' pre-LGR authorities, i.e. Boroughs and Urban Districts. Their mean size is 19,702 population (vide Table 18).

	28 authorities below mean size	21 authorities above mean size	Totals for 49 authorities
Total employees	1393	3173	4566
Total population/1000	269.029	696.389	965.418

TABLE 18. Total Employees and populations in 'large' and 'small' authorities

If there were no 'size' difference, the total number of employees in the smaller (i.e. below mean) authorities would be

$$\frac{4566 \times 269.029}{965.418} = \underline{1272.39}$$

But the actual (from the table above) is 1393 against the predicted 1272.

If there were no 'size' difference, the total number of employees in the 'larger' (i.e. above mean) authorities would be

$$\frac{4566 \times 696.389}{965.418} = \underline{3293.61}$$

But the actual (from the table above) is 3173 against a predicted 3293.

Ignoring Yates' correction

$$\chi^2 = \frac{(1393 - 1272.39)^2}{1272.39} + \frac{(3173 - 3293.61)^2}{3293.61} = 14.18$$

$$= 14.18 \text{ cf } 10.83 \text{ which is the } 0.1\% \text{ value for } 1 \text{ df.}$$

Thus this Chi square test gives a highly significant result from which it may be concluded that there is a difference between 'large' and 'small' authorities in this sample with respect to the numbers of employees.

Total employees/1000 population are: 28 below mean size = 5.178
21 above " " = 4.556
49 authorities = 4.729

(ii) Number of employees/1000 population

This analysis is in respect of 57 type 5 pre-LGR authorities. The dividing line was taken at 6 employees/1000 population.

It will be seen from Table 19 that 50% of the 'smaller' (under 10,000 population) authorities had over 6 employees/1000 population, while only 17% of the 'larger' (over 10,000 population) authorities had over 6 employees/1000 population.

	Number of employees/1000 population		Totals
	over 6	below 6	
Number of authorities below 10,000 population:	8	8	16
Number of authorities above 10,000 population:	7	34	41
Totals:	15	42	57

TABLE 19. Employees per thousand population in 'large' and 'small' authorities

If it is assumed that those authorities with over 6 employees/1000 population were less efficient (i.e. more employees to provide same service) than those with less than 6 employees/1000 population, then proportionately more of the smaller authorities are less efficient than the larger.

Applying Yates' correction,

$$\begin{aligned}
 \chi^2 &= \frac{[(33.5 \times 7.5) - (8.5 \times 7.5)]^2}{(16.41 \times 42.15)} \times 57 \\
 &= \frac{35156.25 \times 57}{413280} \\
 &= 4.85 \quad (1 \text{ degree of freedom})
 \end{aligned}$$

which is significant, and thus authorities which are not small tend to have fewer employees per thousand population, than those that are small.

(iii) The 'larger' authorities

Regression by the least squares method of 24 of the 'larger' (i.e. over 20,000 population) pre-LGR authorities contained in the sample of 57 authorities analysed in paragraph (ii) above, indicates that there is no correlation between the two variables, population, and employees per 1000 population. However, the coefficient is positive which suggests that if the relationship between the variables does not change, larger authorities than those used in these samples would have proportionately larger workforces than do these, and therefore have lower 'productivity'.

(iv) ALGES Questionnaire - response rate

This questionnaire was distributed to each district council in England and Wales; there are 333 non-metropolitan districts, and 36 metropolitan

districts. The response rate is shown in Table 20.

The response rate is lowest for the smallest districts (23%) and highest for the largest districts (83%). There is a general trend to a higher response with increasing population.

NON-METROPOLITAN DISTRICTS IN ENGLAND AND WALES				
ALGES Data Page No.	Population Range	No. of Districts		Response Rate %
		Total	Responding	
1	24060/52000	61	14	23
2	56000/69500	45	14	31
3	70000/75737	35	14	40
4	76000/83720	32	14	44
5	84540/90708	27	14	52
6	91000/95421	28	14	50
7	95990/102000	28	14	50
8	102530/108120	18	14	78
9	109000/122000	20	14	70
10	123000/164000	27	14	52
11	165000/421580	12	10	83
TOTALS :		333	150	

TABLE 20. Response Rates to ALGES Questionnaire

Conclusions

In examining samples of pre-LGR authorities with small populations, it was found that there is some evidence that very small authorities have a larger workforce than the 'norm', but this does not extend to the small authorities. Thus very small authorities (under 10,000 population) may be less efficient than the larger ones examined.

3.4 Productivity

(i) Efficiency

Definition: the relationship between output and input, i.e. $\frac{\text{output}}{\text{input}}$ in some consistent units. Throughout this thesis input is stated in number of employees.

(ii) Effectiveness

Definition: the relationship between output achieved and the stated objective, i.e. $\frac{\text{output achievement}}{\text{stated objective}}$

(iii) Is higher paid staff of higher quality -
more efficient and more effective?

(a) Koontz and O'Donnell (17) (page 191) state:

"Some companies have adopted high pay policies to attract more competent workers ..."

(b) Fayol (27) states:

"Remuneration of personnel is the price of services rendered. It should be fair, and, as far as is possible, afford satisfaction both to personnel and firm (employee and employer). The rate of remuneration depends, firstly, on circumstances independent of the employer's will and the employee's worth, viz, cost of living.... and after that it depends on the value of the employee ... "

(c) Drucker (28) states:

"Promotion should always be based on proven performance." (page 189).

Job evaluation (29) is concerned with assessing the relative demands of different jobs within an organisation. Its usual purpose is to provide a basis for relating differences in rates of pay to differences in job requirements.

(d) Herzberg (30) listed salary among his hygiene factors, i.e. one of those which may not lead to job satisfaction. On the other hand, he listed 'advancement' among his motivators together with, inter alia, achievement, and recognition of achievement.

(e) In some research carried out for the Royal Commission on Local Government in England (22), it says (chapter 3, Housing, Social class, page 9)

"A local authority with a social class index more than average possibly tends to employ better qualified and better paid personnel for supervision and management, the 'quality' of which is likely to vary directly with 'social class'. Alternatively, more personnel of a given calibre could be employed to increase the quantity of supervision and management provided in a 'higher' social class area. "

(iv) Conclusions

In sum therefore it seems that higher pay is generally seen as the result of good performance, and in setting pay standards employers are

likely to feel that higher pay will attract better performers. With increasing technology, the proportion of white-collar employees to blue-collar employees has been steadily increasing. More planning of blue-collar work and more control, increases the number of white-collar employees to the number of blue-collar employees. Therefore a higher white to blue ratio is likely to indicate greater efficiency (vide para 2.7).

3.5 Aspects of Organisation in Post-LGR Authorities

The second questionnaire addressed to the post-LGR authorities asked general questions about organisation and the results are summarised below:

(i) Job descriptions

No. of departments having job descriptions for all posts	=	10
" " " " " " " " some "	=	10
" " " " " " " " none	=	2

(ii) Span of control

No. of departments in which a uniform span of control has been adopted	=	7
No. of departments in which a uniform span of control has not been adopted	=	10
No. of departments in which meaning is not known	=	3

(iii) Programme groups

No. of authorities which have set up programme groups	=	16
" " " " " not set up "	=	6

(iv) Delegation

No. of authorities where delegation from Council to committees in written form	=	21
No. of authorities where delegation from Council/Committees to officers in written form	=	21

* Not all respondents answered the questionnaire in full and not all answers are mutually exclusive, so the number of replies varies.

No. of authorities where delegation from Council/ committees to officers assumed	= 2
No. of authorities where delegation from Council/ committees to officers in other form	= 1
No. of authorities where delegation from chief officer to staff in written form	= 9
No. of authorities where delegation from chief officer to staff assumed	= 11
No. of authorities where delegation from chief officer to staff in other form	= 7

(v) Organisation type

No. of COs who found the Burns/Stalker spectrum helpful in categorising his organisation	= 4
No. of COs who did not find the Burns/Stalker spectrum helpful in categorising his organisation	= 3
No. of COs who thought it not applicable	= 7
No. of COs who had no knowledge of it	= 6

Chief officers were invited to show on a diagram at which end of the spectrum they considered their own organisation to lie. Four answered that theirs were about midway between the centre and the mechanistic end of the spectrum, and two that theirs were about midway between the centre and the organic end of the spectrum. One replied that his external workforce lent towards the mechanistic, and that his professional groups lent towards the organic.

(vi) Techniques

No. of departments making use of ((orintending to) techniques, e.g. PPBS and MbO	= 5
No. of departments not making use of (norintending to) techniques, e.g. PPBS and MbO	= 15

Most answers are to the effect that techniques are not in use; five say

that some limited use is being made of techniques. One reply from a very senior chief officer in charge of a very large department stated that, having once been a keen student of management and techniques, he had become increasingly sceptical about their effectiveness. In the main he said he believed them to be a complete waste of valuable staff time.

(vii) Conclusions

This information suggests:

- (a) that job descriptions and programme groups are widely used.
- (b) the number of departments claiming written delegations from chief officer to staff, 9, seems high.
- (c) the lack of knowledge displayed about theories of organisation as shown by the answers to the questions on the Burns/Stalker spectrum is perhaps not surprising, but is disturbing.
- (d) the lack of use of techniques may reflect a general disenchantment of the type feelingly expressed by one chief officer. On this particular point, the writer expressed similar views in an article (31) and claimed that a broad education, a knowledge of people, and an understanding of how organisations function were pre-requisites of successful management.

3.6 Chief Officer Titles

- (i) A survey of the post-LGR authorities in the East Midlands showed that twenty-one titles were used for thirty-seven posts. The titles of the posts, showing in brackets after each one its frequency of occurrence are:

Chief technical officer (7 No.); Director of technical services (4 No.); Chief technical services officer (3 No.); County Surveyor (2 No.); Technical Officer (2 No.); Engineer and Surveyor (2 No.); Engineer (2 No.); Director of Planning and technical services (2 No.); Technical services officer (1 No.); Borough Engineer (1 No.); County engineer and

surveyor (1 No.); General manager of development and amenities (1 No.); City engineer (1 No.); Chief engineer (1 No.); Chief surveyor (1 No.); Planning officer (1 No.); Director of planning and transportation (1 No.); Chief planning, leisure and technical services officer (1 No.); District surveyor (1 No.); Director of development and planning (1 No.); Surveyor (1 No.).

Of these twenty-one titles, ten which use the word 'engineer' or 'surveyor' may be considered 'old'; and the eleven others may be considered 'new'. The 'old' titles occur thirteen times, and the 'new' titles occur twenty-four times.

(ii) Conclusion

A wide variety of titles is used to describe jobs which essentially cover the same range of main responsibilities (vide the analysis of the ALGES data on functions in paragraph 3.2 above).

3.7 Management Literature, Post-LGR

- (i) This thesis begins with a review of management literature pertaining to municipal engineering in particular. That review suggested that there was a general lack of knowledge of management literature and therefore it was decided to include in the second questionnaire a question on management courses, and one on management literature.

Twelve respondents said they had been on management courses and ten said they found them useful. The course most often mentioned by respondents was the ten-week course at the Institute of local government studies (INLOGOV), Birmingham University, and the course mentioned next most frequently was the three-week course by INLOGOV. A number of other courses were mentioned, some respondents having been on more than one.

Six respondents said they had not found management courses useful (but some appear not to have tried them).

The number of respondents is small (16 No.), but the proportion who found courses to be not useful is high (37.5%).

Seven respondents said they had found management literature useful and the list they gave included the Bains report, the Journal of the Institution of Municipal Engineers, the Municipal Journal, Municipal Engineering, handbooks by the Local Government Review, booklets from the London Boroughs Management Services Unit, and the local authorities management services and computer committee, and Management Today. None mentioned any basic management books, nor Municipal Engineering's management data sheets, (vide paragraph 1.6, Appendix 1).

One respondent said that the general standard of management literature was poor, and not specific enough to local government; he also said that theory seemed remote from practice. Of the twelve who had been on courses, seven said they found literature useful.

(ii) Conclusions

- (a) On the whole, replies seemed to confirm the conclusions of the review of management literature (vide chapter 1), and suggest that chief officers of the post-LGR authorities are not aware of the main sources of management knowledge.
- (b) It suggests also that management courses may be partially failing to meet their objectives.

4.1 The Need

- (i) Henri Fayol (27) in his chapter III says:

"We have seen that the ability most essential in the case of the higher grades of employee is managerial. So we are certain that an exclusively technical education fails to answer the general needs of undertakings, even industrial ones."

"Management does not even figure in the syllabuses of our colleges of civil engineering - why? Is it that the importance of managerial ability is misunderstood? No."

"The real reason for the absence of management teaching in our vocational schools is absence of theory; without theory no teaching is possible."

- (ii) A research report completed in 1964 published as a paperback book.

(32) was the result of two years work with forty-seven firms examining the attitudes and practices of the men who manage industry. Among other things, the Report concludes that

"In the long run, management education is the essential basis for the development of thoroughly efficient and progressive managers."

- (iii) The review of literature (chapter 1, para 1.8) shows a need for municipal engineers to be made aware of the wide field of management knowledge that exists, and also to be given access to it.

- (iv) The report of the Chilver committee (33) concludes that there will be an increasing need for in-career education and training at all levels (chapter 8), and this by inference includes management education and training, since reference is made to the booklet, Mid-career training (15).

- (v) Recent correspondence in The Times pointed to the general need for management training. For example: Vice-Admiral Sir David Clutterbuck (34), Administrative Director, The Business Graduates Association, wrote on 23 June 1976 (inter alia):

"How extraordinary that so much of industry, contending with all the difficulties of market forces and labour relations, is still content to rely on learning on the job. One can only admire the success achieved notwithstanding."

Major General Ashton Wade (35), a company secretary, wrote on 26 June 1976:

"Compared with the United States, where business management studies form an essential part of the educational system (the Harvard Graduate School of Business Administration, to quote one example, is world famous), our own educational authorities are only now just waking up to the fact that business management is an art which is vital to us as a trading nation. Even so Oxford and Cambridge ignore it, as do most of the red brick universities. Only in the recently up-graded universities, e.g. Loughborough and UMIST and some polytechnics are there faculties of business studies. Until our university authorities realize that business management - at both undergraduate and graduate levels - is of equal importance to (say) social science the nation will continue to suffer malaise."

Mr. David Buswell (36) wrote on 26 June 1976:

"But how many graduates can be persuaded to give up a comfortable, secure job and to reduce their standard of living so that they may become better qualified and, hence, better managers?"

"Further, how many companies realize the value of the Master's degree - is there not a danger that the postgraduate is considered over-qualified, too expensive or "academic" (one of industry's most derogatory terms)? In the United States many top managers are the products of business schools and there is a much greater interchange between university and industry."

"If industry is to progress it must be prepared to invest in the education of first-class, skilled managers; it must realize that the present day university is no longer an elitist ivory tower but an intellectual power-house from which it can draw strength."

(vi) R. W. Kelly (37) concludes that the final three phases of the municipal engineer's total education and training do not contain a positive approach towards the development of managers for local government.

(vii) In a paper presented to the Annual Conference of the Institution of Municipal Engineers, Mr. D.E. Lawrance (a member of the Institution) referred to the organisation in a Division of the Severn-Trent Water Authority. An extract from that paper, together with quotations from correspondence between the writer and Mr. Lawrance are given in Appendix 12. It appears that Mr. Lawrance regards management as still very much an art, and does not consider the possibility of its being a science. In view of the lack of criticism of this aspect of Mr. Lawrance's paper, it may reasonably be assumed that his attitude is not dissimilar from that of many of those who

were present at the conference, or who have read his paper since then.

4.2 Potential Change 7

It is being widely suggested that the local government reorganisation of April 1974 has not been entirely successful and that further changes are needed. For example, at the Labour Party's 20th local government conference (Cardiff 24 and 25 January 1976), the Minister for Planning and Local Government, Mr. John Silkin, described the two-tier reorganised local government system as "bonkers" (38).

At the same conference, the Prime Minister, Mr. Harold Wilson, said that local government had been made immeasurably more difficult by the reorganisation two years ago (39).

Also at that conference Mr. Jack Brooks, leader of South Glamorgan County Council, said the proposed Welsh Assembly would be an opportunity for getting rid of the two-tier system, at least in Wales. Again, at that conference, Mr. Derek Senior (who as a member of the Royal Commission on Local Government in England 1966-1969 had presented a very long memorandum of dissent) (40) submitted a paper in which he advocated a uniform scheme of regional government throughout the UK (39).

In June 1976, Mr. John Silkin (41), the Minister for Planning and Local Government, speaking at the annual conference of the Royal Town Planning Institute, said that the tension and conflict created by the two-tier system of reorganised local government had been highly destructive. He later made it clear that he would favour a structure that involved new regional authorities combined with the present district councils.

Also in June 1976 it was reported (42) that the Labour party group on the Welsh Counties Committee had reversed its campaign against the Welsh Assembly, and was actively pursuing another local government reorganisation to merge the Welsh Counties and Districts.

In an article in September 1976 (43), Professor John Stewart said inter alia

"Now, only two years later, the fact has to be faced that the changes made in 1974 have not removed the issue of reorganisation from the political agenda."

"As yet nobody proposes an immediate reorganisation, but issues have been raised, that affect elements in the 1974 re-structuring and which open up the possibility of further change."

"... some see the time perspective of the Report (Layfield) as the time perspective of future reorganisation."

"But they (i.e. changes he refers to) can be seen as precursors of demands for greater change; indeed for a total reorganisation all over again."

"The issue of reorganisation has not been disposed of by the 1974 arrangements."

"Few, I suspect, would opt for a further reorganisation now ... "

Hayden Richards says (44):

"In the canteens and corridors of civic centres and county halls, with summer holidays gone, there is but one serious topic of conversation, the next reorganisation. And the big question being asked is not, 'Will we have another one?' but, 'when?'."

It is reported (45) that:

"Next week's Labour Party conference will hear several calls for yet another reorganisation of local government. No less than eleven constituency parties - from Aberdeen to Woking - have put down resolutions or amendments to resolutions calling for restructuring of local government."

In varying degrees the suggestions for reorganisation include establishing larger organisations (e.g. regions) which would require a substantial management knowledge in officers if they were to be more successful than the present organisations.

The Layfield Report (46) recommends the establishment of some independent review process to examine performance in addition to management services units (chapter 6, para 43). It also makes proposals for achieving the independence of the audit functions from local government and from government departments, because it is felt that the best way to promote all-round efficiency and value for money is by the dissemination of information on best practices to enable true comparisons to be made (chapter 6, para 49), vide Appendix 13.

It is suggested that the method of making comparisons developed in this thesis go some way to meeting that objective.

The publication of information of this kind is likely to stimulate interest in management knowledge.

4.3 Is Management Teachable?

As shown by the analysis of articles published in the IME Journal (vide chapter 1, para 1.2), management skill in municipal engineering has been considered generally to be a practical skill to be learned by trial and error. That a similar view exists in industry is claimed by Vice-Admiral Sir David Clutterbuck (3.4). In the public sector there is also the discussion about whether it is public administration or management that is being considered. L.A. Gunn (47) wrote:

"It was suggested that the narrow or 'machinery of government' view of public administration finds some sort of parallel in the equally narrow view of management as 'management techniques'. Both views of their subjects are inadequate, but for rather different reasons. Indeed the strengths and weaknesses of each seem to complement those of the other. Thus the narrow view of PA tends to emphasise structure rather than process and context rather than techniques, while the narrow view of management reverses tendencies. This could be dangerous if, for example, a swing in academic fashion led us to import management techniques to the teaching of PA, at the expense of the more traditional material which does at least have the virtue of emphasising the unique constraints and complexities of management in the public sector. Teachers should learn something from the painfully-learned lessons of management and industrial consultants who have been called in by successive governments to make Whitehall more efficient or business-like, only to realise that public administration is indeed different and, in many ways, more difficult."

"Public administration teaching will seem to have least in common with management teaching if a narrow view is taken of each, as 'machinery of government' and 'techniques of management' respectively. Even then, the two should be seen as complementary rather than mutually exclusive approaches."

"Viewed more widely as 'administrative studies' and 'management studies', PA and management appear to have many disciplinary inputs in common."

"They (i.e. teachers of PA) should attempt to extend their knowledge both of management techniques and of the academic disciplines which have lately contributed so much to management studies."

Richard A. Chapman (13) writes in his Conclusions and recommendations:

"As far as the universities are concerned, for nearly fifty years public administration teaching has been provided as a small element in degree programmes in political studies."

"... little relevant theory or significant original ideas have been produced ..."

"There is, therefore, considerable confusion about the use of the term 'public administration' fertilised by the apparent absence or lack of clarity in the objectives of university public administration courses."

"It does not seem helpful to produce for this report a definition of public administration other than in the broadest possible terms - such as 'management in the public services'"

Henri Fayol (27) whose word 'administration' (in French) has been translated in English to 'management' said (quoted in the Foreword):

"The meaning which I have given to the word administration and which has been generally adopted, broadens considerably the field of administrative science. It embraces not only the public service but enterprises of every size and description, of every form and every purpose."

In chapter III he says " ... I hope that a theory will emanate from it (i.e. a general discussion). This done there is the question of teaching to be solved. Everyone needs some concepts of management ..."

"Hence an effort must be made to spread management ideas throughout all ranks of the population. Obviously school has a large part to play in this teaching."

To sum up the points made by these authors, there is an overlap in the knowledge required to discharge a public administration, and a management function. Both public administration and management have been taught for many years, but the absence of a theory is something of a handicap.

In considering whether management is teachable or not, it may help to consider that management has both an art and a science element (vide chapter 2, paragraph 2.1); the art to be learned on the job, and the science in the lecture room. Perhaps it should be noted, too, that many of the ancient writers, for example, Xenophon (47), give examples of the art of management.

4.4 Conclusion

It is considered that there is an urgent need for municipal engineers

to be made aware of the extent of management knowledge. This can be done through education, and through training. R.W. Kelly (37) recommended inter alia that there should be a systematic programme of management development for post-graduate municipal engineers.

In a letter to the editor (49) the writer suggested inter alia that either the Institution, or the Council of Engineering Institutions (CEI), should establish a formal framework within which each member could pursue his own self-development in an orderly and effective manner. The Academy for Professional Development (of the International City Management Association) of which the writer is a member and who therefore has experience of its process, was cited as an example for such a framework. First though the profession has to recognise the extent of the need for management education and training (vide the Review of Literature, Chapter 1, paragraph 1.1), both in respect of individuals, and of the profession. It can then make plans to fulfil the demand which these needs reveal.

Courses for established examinations in public administration and in management exist, e.g. IMA, DPA, and master's degrees. The Institution may consider introducing a Diploma which would serve to reveal to students the extent of management knowledge in order to:

- a) acquaint students of its breadth,
- b) suggest sources of existing knowledge,
- c) reveal to them areas for future individual study.

- (i) Similar data to those analysed in this thesis should be analysed for the country as a whole with a view to developing inter-authority comparisons. The data already collected in the local government manpower watch may be suitable, if it can be made available.
- (ii) Data similar to those analysed herein for technical services should be analysed for other departments in similar ways to those used in this thesis with a view to developing inter-authority comparisons. The data already available in the local government manpower watch may be suitable.
- (iii) Refinements to the prediction formula for the number of employees required for a particular function are needed.
- (iv) Preliminary analyses of the area of local authorities, density of population, level of rates, and political control, suggest that further work on these may be fruitful. The Chartered Institute of Public Finance and Accountancy publishes annually the CIPFA Return of Rates (50) which gives data on most local authorities which may be useful for this purpose. The Municipal Year Book (51) which is published annually gives data on population, areas, and political control, which may be useful for this purpose.
- (v) The second questionnaire circulated to chief technical officers in the East Midlands sought information on the number of employees engaged on particular functions. These will form the basis of a future paper.
- (vi) Much of this thesis is based on comparisons within local authorities in the East Midlands. Comparisons of relative data, if correctly carried out, will give an assessment of relative quality. However, even the best of the results revealed by such comparisons may be poor. Thus, comparisons of relative data can only be used with confidence when the effectiveness of the mean value had been validated. Future work should

seek therefore to evaluate the effectiveness of the values revealed in these studies.

APPENDICES

Appendix 1. Background to These Studies

1.1 In July 1971 it had become obvious to the writer as (a) a chief officer of fifteen years standing, (b) an alumnus of the advanced course for senior officers organised by the Institute of Local Government Studies, Birmingham University, and (c) as a regular correspondent for Municipal Engineering, that the management education of Municipal Engineers left much to be desired in that they seemed unaware of the vast amount of management knowledge that existed, albeit mainly in the private sector. But these views need to be tested by reviewing the literature.

It is true that the Institution of Municipal Engineers organised short courses on management. At that time (July 1971) mainly as appreciation courses of other courses, and later as courses giving an introduction to particular management subjects. The Institution also organised courses in conjunction with other bodies such as NEDO and LAMSAC on techniques and computers.

1.2 It seemed that chartered municipal engineers who had spent not a few years qualifying as such, felt that management was something that could be learned in a short time at one or more short courses in management techniques.

The writer's own reading of very many books which were mentioned at the Institute of Local Government Studies, or which he had seen reviewed in Management Today or some other publication, convinced him that very few municipal engineers knew of the vast amount of management knowledge that already existed, or knew the key to get access to that knowledge if they did suspect its existence. There is a real need to interpret and consolidate what is already known, rather than simply adding to our stock of management knowledge. Municipal engineers (and others) expect literature to be specifically related to their work.

There is also the problem of material becoming 'lost', i.e. partly because of the huge amount of information on many subjects, a particular piece of information or knowledge falls from view and is forgotten. An example by Professor Milton Friedman (52) was given in an article by William Rees-Mogg in The Times (23 August 1976) referring to a previous statement by Professor Friedman about his discovery that there was a two-year lag between changes in money supply and changes in prices. Professor Friedman wrote,

"I originally thought I was the first to arrive at that result, but a couple of years ago I was taken aback on re-reading the great English economist, William Stanley Jevons (53), to find in an essay first published in 1863 the sentence "An expansion of the currency occurs one or two years previous to the rise in prices"."

The problem of how to apprise municipal engineers of the existence of the body of knowledge and how to gain access to it seemed to demand something other than courses, since few can attend at one time, and the problem was to make the information available to 10,000 or more municipal engineers.

1.3 It seemed that the demand could only be met by a series of articles on management, but there were three difficulties: (a) that articles are rarely read when they are 'educational', and even if they are, they are not usually extracted for future reference; (b) that for the greatest benefit, the articles should be available for future reference; and (c) selecting a writer for such a series. The purpose of the articles should be to survey, sieve and consolidate existing management knowledge for municipal engineers, who are too busy (or know not where to look) to do it for themselves.

1.4 The ideal existing medium for such a series was the well established Data sheets published by Municipal Engineering covering such subjects as roads, street lighting, sewerage and law; publication of the management series began in May 1972. A brief note of the early history of these

Data sheets is given at the end of this Appendix.

1.5 In addition to writing the Data sheets themselves, it was decided to write a commentary on each sheet which would point to any limitations in the subject discussed, or to problems posed by it, or to further work which it suggested. The forty sheets published up to June 1976, and the commentaries, are included in Volume 2 of this thesis. It was also decided to take advantage of the unique opportunity presented by local government reorganisation to do a 'before and after' study of the management structure of Municipal Engineers' departments, and to find out in the process what part, if any, the Management Data sheets played in setting up and running the new departments.

1.6 Municipal Engineering Data Sheets

Notes on early history, by D.I. Harrison M.C., Managing Editor

Local government engineers and surveyors have no lack of technical information available to them. Unfortunately, much of it is in a form which must constantly be up-dated, and not always conveniently. Again much of it is unrelated, in that the total information appears in various sources. This is particularly so with manufacturers' information sheets which naturally deal only with their own group of products.

This was the situation which, early in 1961, was discussed with Leslie Ellis CEng, MICE, FIMunE, then city engineer of Durham, who agreed to produce some draft Data sheets that would bring together in simple reference form, suitably indexed, related information on various aspects of the local authority engineer and surveyor's work. It was a more daunting exercise than had first been envisaged and it was not until July 1962 that the first data sheet appeared in Municipal Engineering: 'Roads - subgrade, foundation, base'. The early Data sheets concentrated on the 'roads and bridges' aspect of the engineer and surveyor's work but, in 1964, it was realised that there was a growing demand for the data sheets

to be extended to many other aspects of his work. Since then the scope has been continually widened to cover even such aspects as law and management.

Note: The reader wishing to read the text in full should now read
Volume 2.

Appendix 2. IME Published Articles

Analysis of Articles Published in The Journal* of IME 1873 - 1971

2.1 Purpose

The purpose of the analysis is to obtain a broad picture of the extent of management knowledge revealed in the articles; to see what subjects occur most frequently; to note which (if any) subjects do not appear at all, and to find trends. It is not intended to prepare a definitive analysis of every article in depth.

The accessibility of the material to the reader is inadequate because the index to each volume does not deal with individual management subjects, neither does the cumulative index which is published at intervals of about twenty-five years.

Thus a further purpose is to collate information on the location of management articles, to provide a subject index to them, and to note the frequency with which authors occur.

2.2 Method

- (a) The method adopted is to scan the title of every article listed at the beginning of each volume. In later volumes there is an author and title index which alone is scanned. So as to avoid a mass of detailed information in this part of the Appendix, that detailed information is set out in Annexes 1-5.
- (b) Every article is classified as (i) management, (ii) engineering, and (iii) other, and recorded in Table 21, page 132.
- (c) Each article whose title suggests that it is primarily on management (or administration) is itself scanned. The contents of the article are assessed by reference to eighteen subjects shown in Table 22, and recorded in the Table when the subject is mentioned. It is

* The title of the Journal of the Institution of Municipal Engineers has been changed from time to time, but throughout this thesis the word journal is used.

general management, not contract or site management which is referred to throughout.

- (d) Any article whose content is not clear from the title, and which may be about management, is scanned, to ensure as far as possible that no management article is overlooked.
- (e) Any article whose title indicates that it is about management but which contains no real management material is not recorded.
- (f) Where they are identifiable, Presidential Addresses are not scanned.
- (g) Early volumes are based on papers read at meetings, and papers submitted but not read are shown in an appendix in each volume. They have been included in the analysis.
- (h) Until 1962 annual conference proceedings were included in the bound volumes of the Journal and indexed therein. From 1962 they were published separately (unindexed), but for consistency have been included in the survey. A short report of the annual conference, including a list of the papers presented at the conference, is published in the July issue of the Journal.
- (i) The name of each author, the title of his paper, the number of references, and the volume and page number are entered on a separate list (Annex 5).
- (j) A note is made of management articles which in the writer's opinion have interesting management content for possible future reproduction in whole or in part (the 'best' articles) vide Annex 5.
- (k) Each article is indexed by reference to subjects, which was subsequently used to check and expand the entries made in Table 22.

The following overview and conclusions stem from Annexes 1-5, and the reader requiring detailed information is requested to read those Annexes.

2.3 Overview

There is hardly any mention of the pioneers of management thinking or of matters such as organisation theory or principles of management (vide Annex 3).

One of the references in a paper in Volume LVI, 1929-30 by Leitch is The Principles of Scientific Management by F. W. Taylor (54). There is only one other reference to Taylor, in Volume 80. (But there is one to an American theory of motion study in Volume XLVIII, 157.) In volume LXXIV, 1947-48 Baxter mentions Mary Parker Follett, and she is referred to again in the following year by Bacon, and by Gauntlett in 1951-52 ("Enquire within alias O & M", bibliography). Very many of the papers which use administration in the title, or in the text are simply lists of duties for which the department is responsible. Almost never is there any discussion on the process of management, or of human relations.

One or two subjects have a vogue; e.g. in the 1940s there was considerable interest in costing, and later on in work study. Most articles tend to be uncritical statements of a system or method adopted by the author, and lack depth. The disadvantages of the system being described are not usually discussed.

Lack of understanding of management is apparent from the articles but not often expressed. For example, A.S. Hamilton, Borough Engineer and Surveyor of Blackpool and a Past President of the Institution, wrote in The Evolution of Municipal Engineering Volume 82 (55) 1955-56 that there were nine services to be carried out by local authorities, classified as follows:-

- | | | |
|---------------|--------------------|----------------------------|
| 1 ceremonial | 4 medical | 7 financial |
| 2 information | 5 educational | 8 managerial |
| 3 legal | 6 crime prevention | 9 technical and scientific |

He went on to define 'managerial' as including the management of the various services and undertakings not primarily technical and scientific, e.g.

baths, libraries, markets, transport, parks, cemeteries and estates, i.e. those which are almost identified as 'commercial' services.

On the other hand, several authors were aware of problems and the need for better management knowledge and training.

H. Donavon Gauntlett (56) in Volume LXXVIII 1951-52 said

"Most books and papers written on the administration and organisation of an engineer's department deal with the structure of the department and the type of forms used, i.e. the tools. These comprise only the surface or clothing of what is in reality a living organism. The living being deep under the forms is worthy of detailed study. In my opinion, such study is vital to the future of the profession."

He seems to have been little heeded.

A.S. Turner (57) in Volume 83, 1956-57, says that a deputy or chief finds himself in a world which as an assistant he hardly knew existed.

"In the end he will sink or swim on the qualities he has managed to 'pick up' during the course of his lifetime, although to the end of his days he may be seriously deficient in many of the qualities that his position requires."

M.R. Hawkins (58) in Volume 95, 1968, said

"Engineers are becoming increasingly concerned with highly complex organisations, consequently any method of developing managerial qualities by trial and error is totally unacceptable and a properly based scientific approach to the subject is becoming more appreciated and urgent."

Stuart Mustow (59) in Volume 97, 1970, said

"In this complex world the old hit-and-miss approach to management is not good enough, and a management development approach is needed."

Note that the three latter authors referred to the lack of formal means of gaining management knowledge and described the situation as late as 1970 as hit-and-miss. In the same year, the Secretary of the Institution informed the writer (20 January 1970) that the Institution did not recommend a reading list for the Part 3 Examination which it said "is based upon training and experience".

An indication of the widespread lack of management knowledge is illustrated by the fact that a fairly elementary paper, "An Introduction

to Management in Municipal Engineering" by the writer (31) was accepted for publication. Some confirmation of this view came when no correspondence ensued.

It is clear therefore that management has been for municipal engineers a very limited concept.

2.4 Conclusions on the Survey of Articles Published in the IME Journal

- (i) There has been little discussion of management in the Journal over the period 1873-1971 compared with that of engineering (vide Annex 2, para 2.3 (i)).
- (ii) Management has been considered to be a practical skill to be acquired by trial and error on the job (vide para 2.3 ante).
- (iii) The attitude exemplified in (ii) above may stem from the concept of management solely as an art, and a widespread ignorance of the existence of a wide field of management knowledge.
- (iv) There is an increasing interest in management as a subject, as exemplified by an apparent trend to an increasing proportion of management articles being published in the Journal (vide Annex 2, para 2.3 (ii)).
- (v) The management articles concentrate on a narrow field covering administration, techniques, budgeting and work study (vide Annex 3, para 3.7 (i)).
- (vi) It appears that the number of subjects per article, and their range is increasing, especially since 1952 (vide Annex 3, para 3.7 (ii)).
- (vii) About two out of three of the management articles cite references, and there seems to be a trend towards there being fewer articles having no references at all (vide Annex 4, para 4.7 (i)).
- (viii) A higher proportion of those articles considered by the writer on a

subjective basis to be most interesting (the 'best') (vide Annex 5, para 5.3) contain references than do the management articles as a whole.

- (ix) On average, the 'best' articles cite more references per article than do the management articles as a whole.
- (x) More of the articles by 'prolific' authors cite references than do the authors of the 'best' articles, but on average the 'prolific' authors cite fewer references per article than do the authors of the 'best' articles.
- (xi) The use of references to previously published articles in the Journal is very limited but has increased towards the end of the period examined. It is suggested that it would be useful to publish selected readings from the Journal from 1873 onwards showing the developing interest in management.

Note: The reader who has read Annexes 1 to 5 inclusive is invited to proceed to Appendix 3.

Annex 1. Numbering of IME Journals

With one exception, the first eighty-three volumes each cover a period of one year, approximately from June to May. The exception was the fourth volume which either covered two years (or omitted one year 1876-77). Roman numerals were used from I to LXXXIII.

When Volume LXXXIII ended in May 1957, the next volume covered the remaining half of the year, and ended in December 1957. The style of numbering changed from Roman to Arabic, commencing with Volume 84.

The effect of the first change was to bring the numbering back into line with the year so that volume numbers subsequent to 84 (as those 1 - III) correspond to the number of years since publication began. Thus Volume 100 coincided with the centenary of the Institution and with the commencement of publication of the Journal.

Annex 2. Analysis of the Numbers of IME Published Articles*

2.1 Overview

The total number of articles published in the Journal of the Institution from 1873 to 1971 is shown in Table 21 and is 4066. These are shown diagrammatically in the upper line in Figure 14, page 131. The number of management articles for the same period is also included in Table 21 and is 130, which expressed as a percentage of the total is 3.197%. They are plotted (hatched) on Figure 14, page 131.

It appears that during the first 47 years there was a trend towards more articles in each volume, with a peak in 1913-14 (Volume XL). From the early 1920s there was a considerable increase in the number of articles per volume, reaching a second peak in 1936-37 (Volume LXIII). During the second world war the number of articles was substantially reduced, reaching a nadir in 1940-41 (Volume LXVII). Since then, the trend seems to have been slightly upward.

It appears that before the war, the papers published were most if not all of those read at District meetings. Since the 1939-45 war, all those that are read at District meetings are not automatically published.

So far as management articles are concerned, there were very few in the first 40 years, i.e. until 1913-14. From then on the trend has been for more volumes to contain a management article (from 1945-46, Vol. LXXII, there is at least one in every volume), and for there to be an increasing number of articles per volume. There does not appear to be any relationship between the number of management articles per volume and the total number of articles per volume.

The proportion of management articles to the total published in each

* NB: The volumes are numbered consecutively but there is none for 1876-77 Volume 84 covers only 6 months (vide Annex 1)

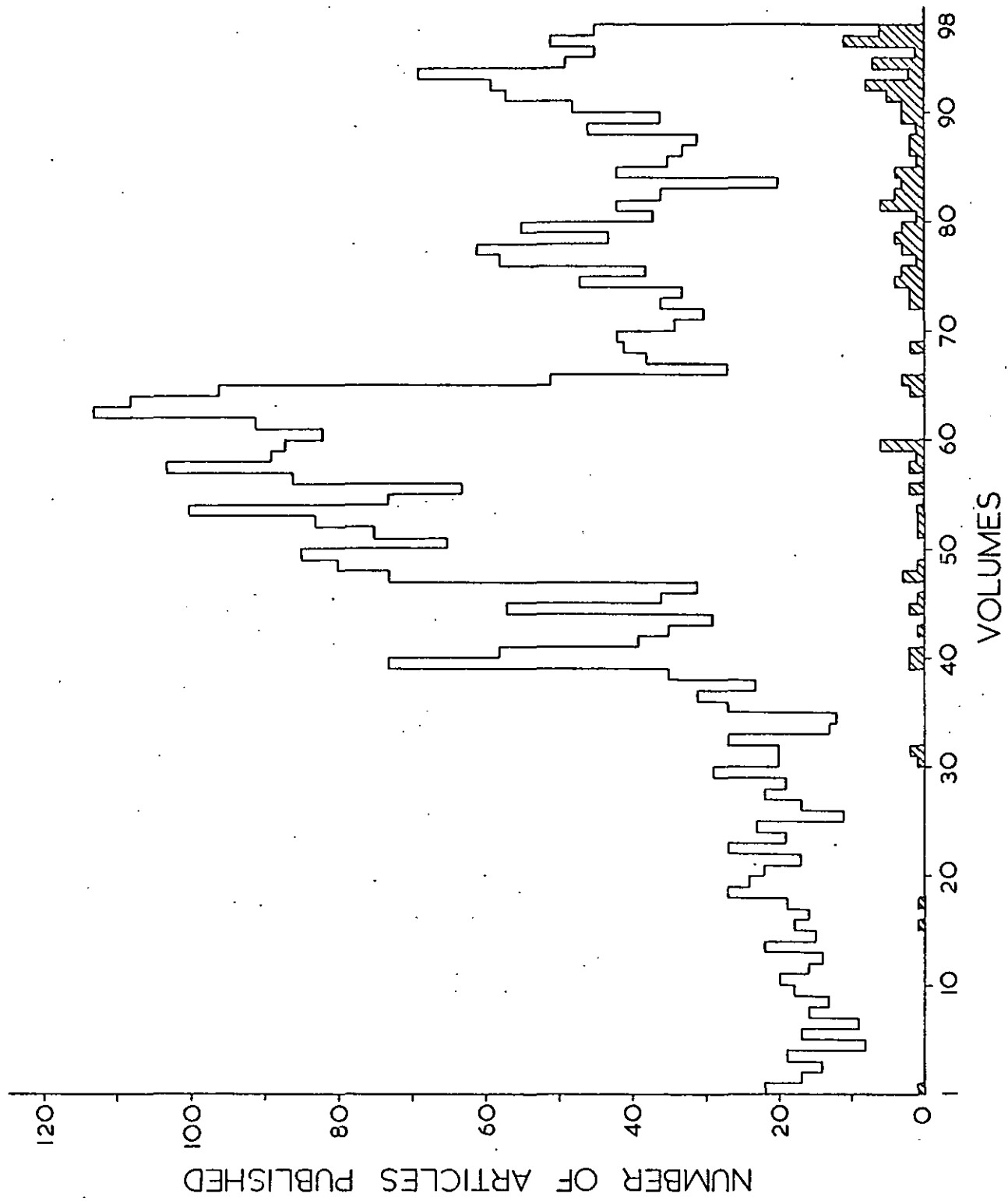


Figure 14

Fig. 14 Histograms showing all articles (upper line) & management articles (hatched).

Volume	Year																									
	Number	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV	XXV
Management articles		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering " "		21	17	14	17	8	16	8	15	11	15	17	15	13	19	13	15	15	16	25	19	20	17	27	19	22
Other " "		0	0	0	2	0	1	1	1	2	3	3	1	1	3	2	2	1	2	2	5	2	0	0	0	1
Totals " "		22	17	14	19	8	17	9	16	13	18	20	16	14	22	15	18	16	19	27	24	22	17	27	19	23
Ratio of management articles to the total, %		22	17	14	19	8	17	9	16	13	18	20	16	14	22	15	18	16	19	27	24	22	17	27	19	23

Table 21. Classification of articles in the IME Journals 1873-1971

1	Organisation theory															
2	Administration/management	1		1	1		1	2		2	2		2	1	3	1
3	Principles of management			1			1									
4	Decision-making															
5	Communication															
6	Motivation															
7	Leadership													1		
8	Statistics									1	1					
9	Budgeting			1	1		1	1						1		
10	Policy formulation						1									
11	Management techniques				1						1			1		
12	Social sciences															
13	Personnel selection	1					1									
14	Industrial relations															
15	Operational research															
16	Computers (not in design)															
17	Network analysis (---)															
18	Work study															1
	Totals	2		3	3		4	4		2	4	1	3	3	4	1
	Ratio (%) of subjects per article	2		3	3		4	2		1	2	1	1 1/2	3	1 1/2	1

Table 22. Analysis of subject matter in the management articles, IME Journals 1873-1971

Continued overleaf

Volume	Year		1967		1968		1969		1970		1971		Totals																																					
	Number		LIII		LIV		LV		LVI		LVII																																							
Management articles	1	1	0	2	0	2	1	6	0	0	0	2	3	0	0	0	2	0	0	2	0	0	0	2	2	4	3	1	2	4	3	1	6	4	3	4	1	2	2	1	3	3	5	8	2	7	1	11	6	130
Engineering " "	80	96	69	58	81	96	83	78	81	85	107	103	88	51	27	38	37	41	30	26	33	31	41	33	52	56	37	50	35	32	30	14	34	31	27	29	42	32	41	46	45	60	35	40	35	33	3727			
Other " "	2	2	4	2	4	4	4	2	1	5	5	2	5	0	0	0	2	1	4	4	1	0	2	2	4	3	2	1	1	4	2	3	4	3	4	0	3	1	4	5	5	1	7	4	5	6	209			
Totals " "	83	99	73	62	85	102	88	86	82	90	112	107	96	51	27	38	41	42	34	30	36	33	47	38	57	61	43	54	37	42	36	20	42	35	33	31	46	36	48	56	58	69	49	45	51	45	4206			
Ratio of management articles to the total, %	83	99	-	31	-	51	88	14	-	-	-	53	32	-	-	-	20	-	-	-	18	16	12	13	57	30	11	18	37	7	9	7	10	35	17	15	46	12	16	11	7	34	7	45	5	7	31			

Table 21. Classification of articles in the IME Journals 1873-1971 continued.

1	Organisation theory																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
---	---------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 22. Analysis of subject matter in the management articles IME Journals 1873-1971 continued

volume is very low.

Of the 98 volumes studied, 48 contain management articles, and 50 do not. The number of management articles in journals grouped in five year periods is shown in Table 23.

2.2 Management Articles per Volume

The number of management articles per volume are included in Table 24, and are shown hatched in Figure 14. These have been extracted and plotted in sequence, leaving out the volumes that have no management articles in them, in Figure 16.

This probably confirms that the general trend is for there to be more management articles published per volume as time passes, although it is not as clear as it is in Figure 15 (NB: the number of all kinds of papers is not constant per volume). The pattern is erratic.

Table 24 and Figure 17 show the ratio of management articles to total articles per volume, and the trend appears to be a rising one. To try to get a clearer picture, these figures have been plotted as logarithms in Figure 18 but it is no clearer, in fact the scatter is greater.

Square roots are then tried and these are shown in Figure 19. This does not appear significantly different from the basic data in Figure 17.

2.3 Conclusions

- (i) There has been little discussion of management in the Journal over the period 1873-1971 compared with that of engineering.
- (ii) There is an increasing interest in management as a subject as exemplified by an apparent trend to an increasing proportion of management articles being published in the Journal.

Volumes	Number of Management Articles
I - V	1
VI - X	0
XI - XV	0
XVI - XX	2
XXI - XXV	0
XXVI - XXX	0
XXXI - XXXV	3
XXXVI - XL	2
XLI - XLV	5
XLVI - L	5
LI - LV	3
LVI - LX	11
LXI - LXV	5
LXVI - LXX	2
LXXI - LXXV	8
LXXVI - LXXX	14
LXXXI - 85	17
86 - 90	9
91 - 95	25
96 - 100	18 (3 years only)

TABLE 23. Number of management articles in groups of 5 volumes.

These are collated from Table 21.

These data are shown diagrammatically in Figure 15.

This confirms that the general trend is for there to be more management articles published as time passes.

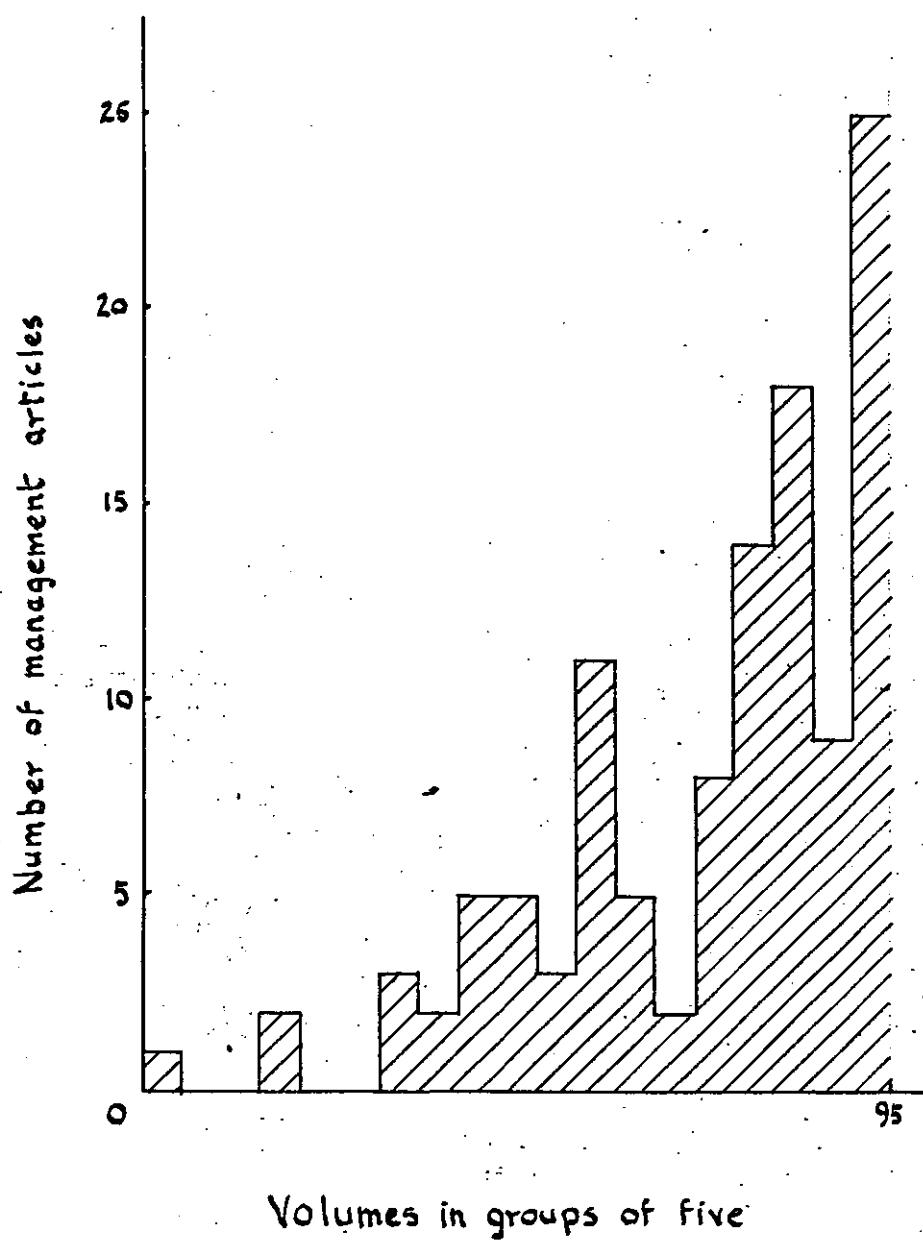


Figure 15. The number of management articles published, in groups of five volumes

Volume		Ratio of Management Articles to the Total		% as Logarithms	% as Square Root
		Numbers	%		
1	I	1/22	4.55	0.6580	2.133
2	XVI	1/18	1.14	0.0569	1.068
3	XVIII	1/19	5.26	0.7210	2.298
4	XXXI	1/20	5.00	0.6990	2.236
5	XXXII	2/20	10.00	1.0000	3.162
6	XL	2/71	2.82	0.4502	1.679
7	XLI	2/59	3.39	0.5302	1.841
8	XLIII	1/35	2.86	0.4564	1.691
9	XLV	2/56	3.57	0.5527	1.889
10	XLVI	1/36	2.78	0.4440	1.667
11	XLVIII	3/71	4.23	0.6263	2.057
12	XLIX	1/80	1.25	0.0969	1.118
13	LII	1/75	1.33	0.1239	1.153
14	LIII	1/83	1.20	0.0792	1.095
15	LIV	1/99	1.01	0.0043	1.005
16	LVI	2/62	3.23	0.5092	1.797
17	LVIII	2/102	1.96	0.2923	1.400
18	LIX	1/88	1.14	0.0569	1.068
19	LX	6/86	6.98	0.8439	2.642
20	LXIV	2/107	1.87	0.2718	1.367
21	LXV	3/96	3.13	0.4955	1.769
22	LXIX	2/41	4.88	0.6884	2.209
23	LXXIII	2/36	5.56	0.7451	2.358
24	LXXIV	2/33	6.06	0.7825	2.462
25	LXXV	4/47	8.51	0.9299	2.917
26	LXXVI	3/38	7.89	0.8971	2.809
27	LXXVII	1/57	1.75	0.2430	1.323
28	LXXVIII	2/61	3.28	0.3579	1.811
29	LXXIX	4/43	9.30	0.9685	3.050
30	LXXX	3/54	5.56	0.7451	2.358
31	LXXXI	1/37	2.70	0.4314	1.643
32	LXXXII	6/42	14.29	1.550	3.780
33	LXXXIII	4/36	11.11	1.0457	3.333
34	84	3/20	15.00	1.1761	3.873

TABLE 24. Ratio of Management Articles to the Total.

Continued 0/page

Volume		Ratio of Management Articles to the Total		% as Logarithms	% as Square Root
		Numbers	%		
35	85	4/42	9.52	0.9786	3.085
36	86	1/35	2.86	0.4564	1.691
37	87	2/33	6.06	0.7825	2.462
38	88	2/31	6.45	0.8096	2.540
39	89	1/46	2.17	0.3365	1.473
40	90	3/36	8.33	0.9206	2.886
41	91	3/48	6.25	0.7959	2.500
42	92	5/56	8.93	0.9509	2.988
43	93	8/38	13.78	1.1393	3.712
44	94	2/69	2.90	0.4624	1.703
45	95	7/49	14.29	1.1550	3.780
46	96	1/45	2.22	0.3464	1.490
47	97	11/51	21.57	1.3338	4.645
48	98	6/45	13.33	1.1249	3.651

TABLE 24 (continued) . Ratio of management articles to the total.

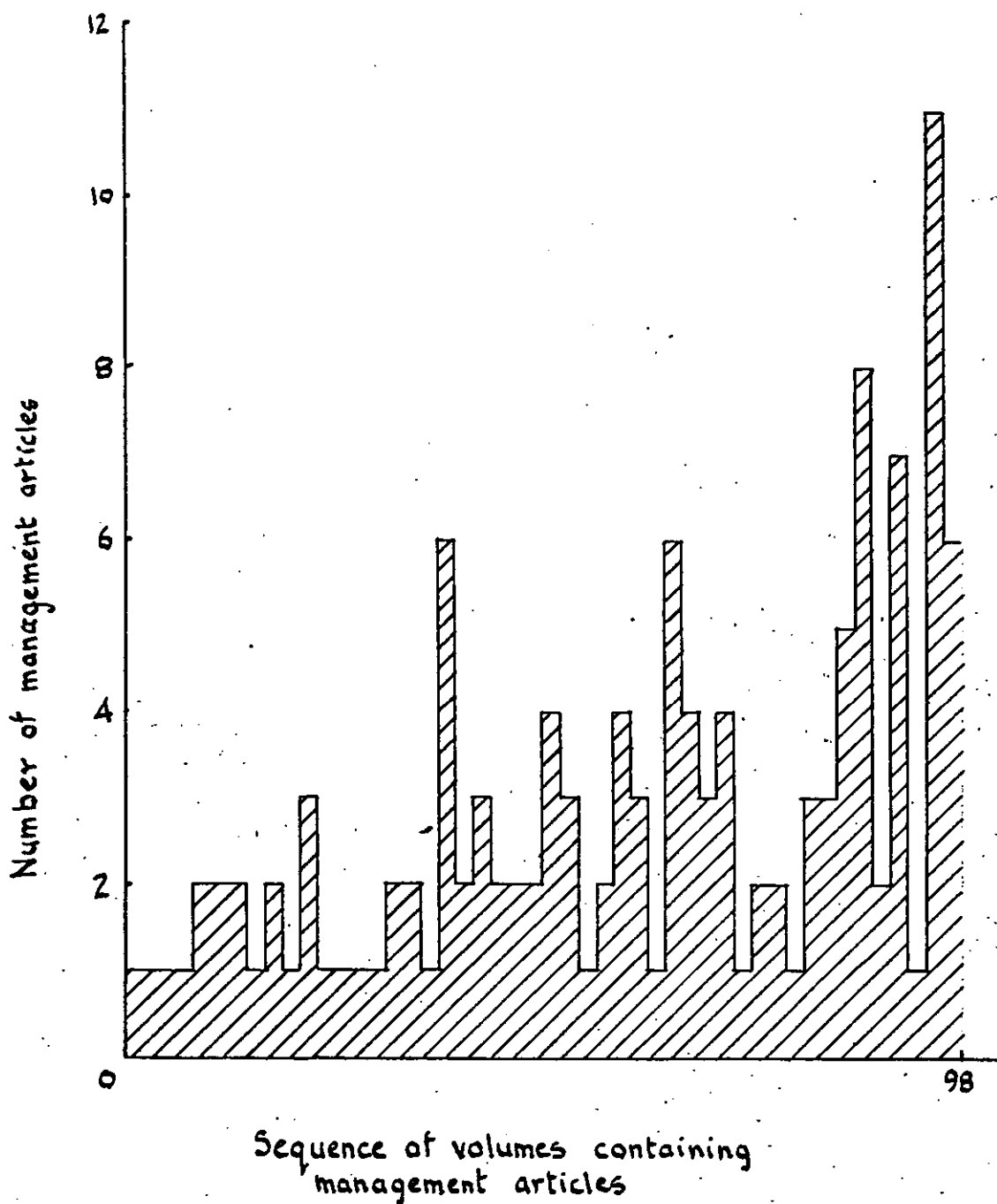
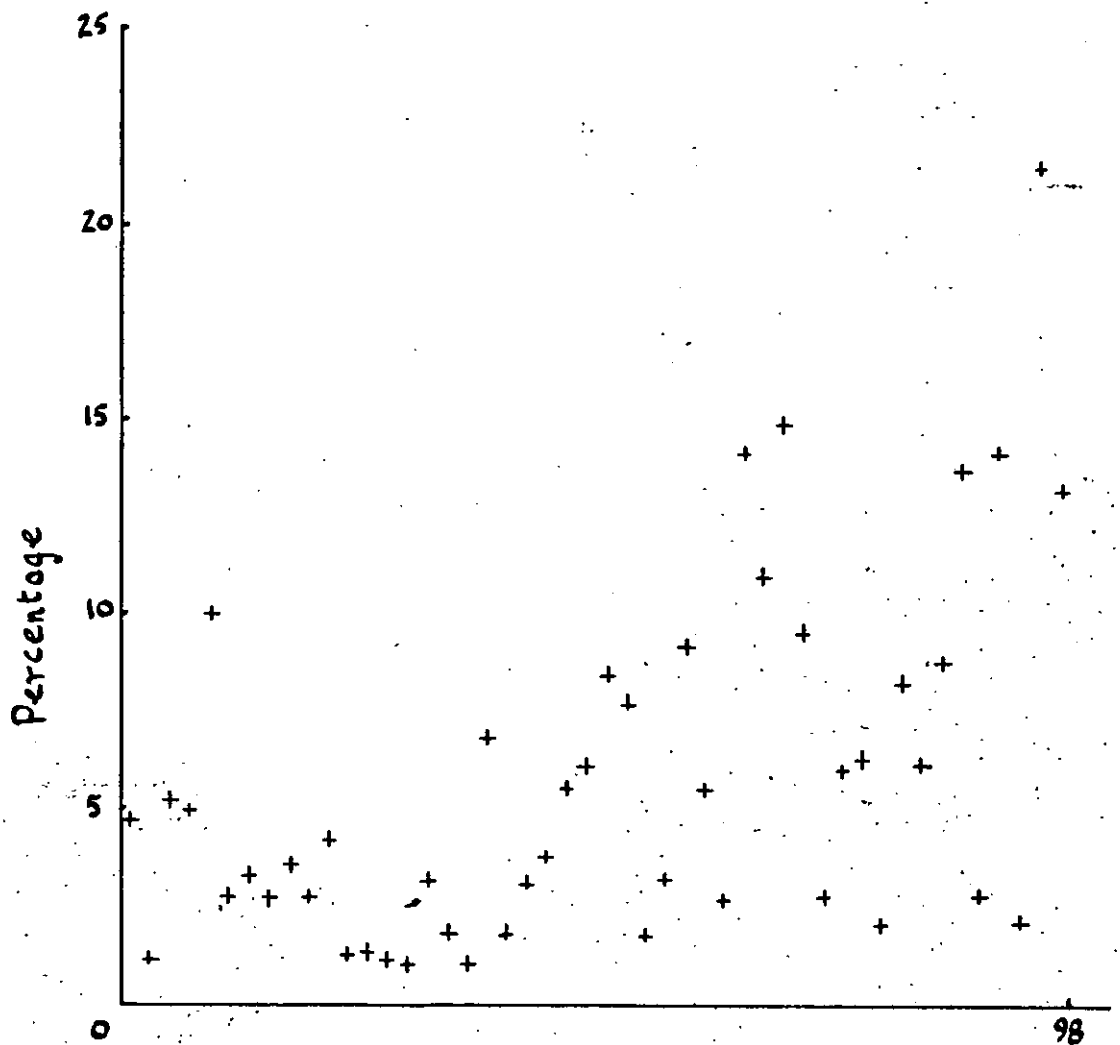


Figure 16. The number of management articles/volume in order of publication



Sequence of volumes containing
management articles

Figure 17. Management articles as a percentage
of all articles/volume

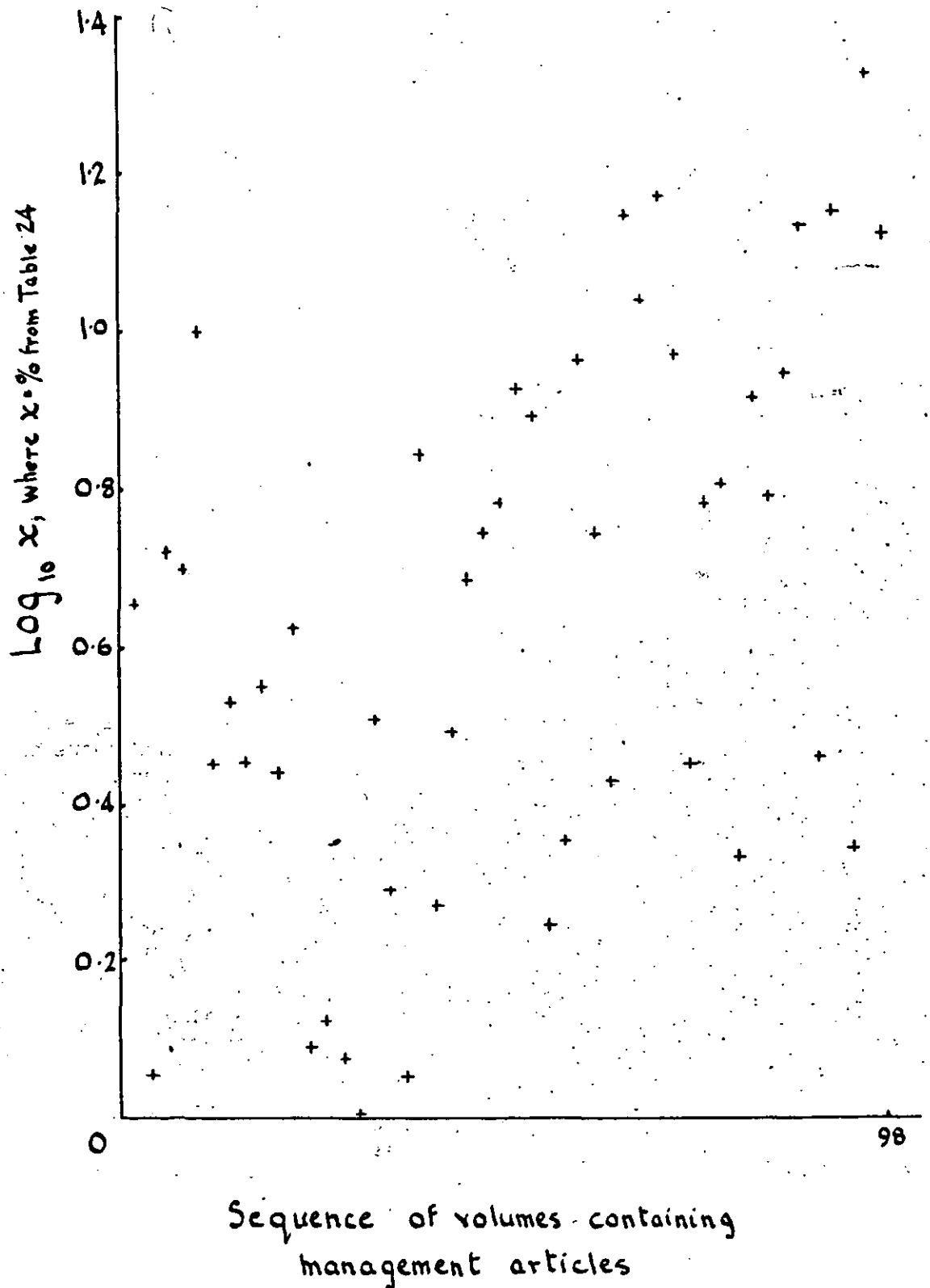
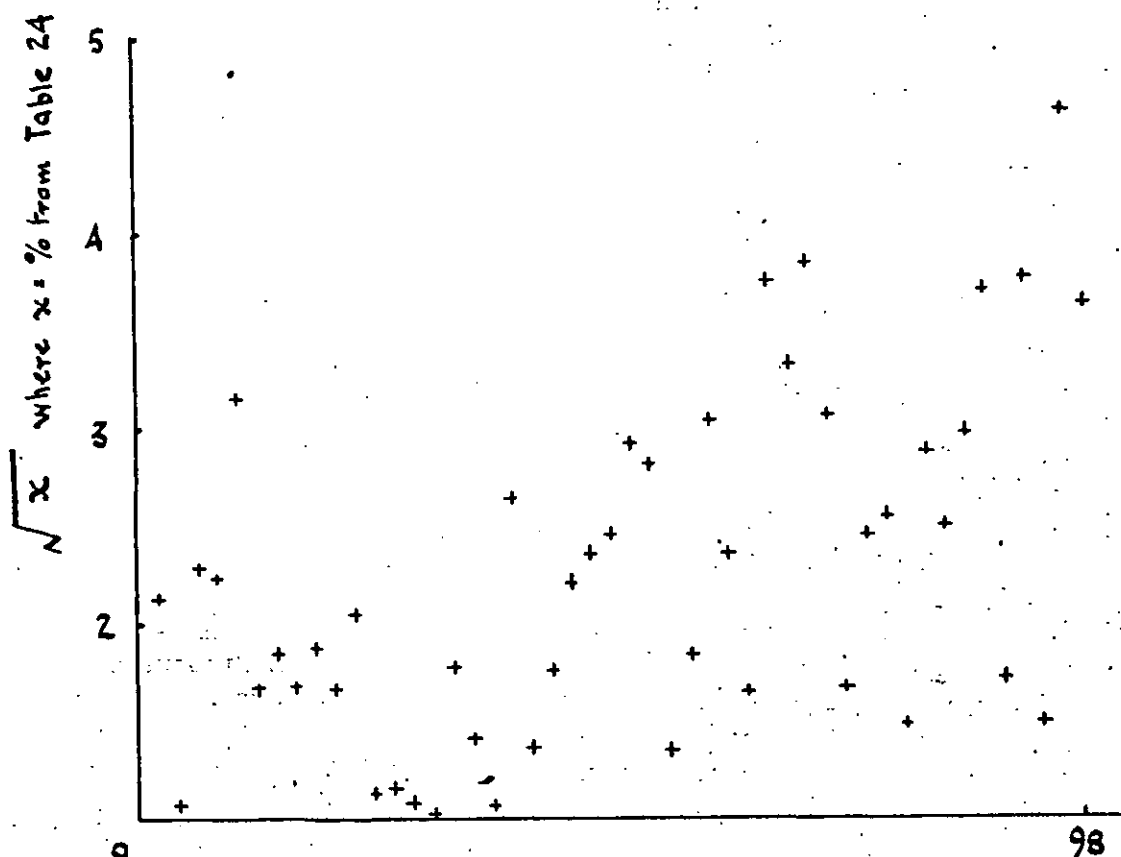


Figure 18. Management articles as a percentage of all articles/volume expressed as logarithms.



Sequence of volumes containing
management articles

Figure 19. Management articles as a percentage of all
articles/volume expressed as square roots.

Annex 3. Management Subjects in the IME Published Articles

3.1 Introduction

The eighteen subjects (Table 22) cover a range of common management matters spreading from day-to-day items to less tangible and more abstract concepts.

These in approximate order from practical to abstract are shown in Table 25, page 144.

There are 297 subjects in 130 articles. This is an average of 2.28 subjects/article. These data are plotted in Figure 20; and are plotted with each subject as a percentage of the whole in Figure 21. The subjects were chosen to cover the wide field of management knowledge and to illustrate those subjects which municipal engineers have found of interest and those they have not.

3.2 Subjects - percentages

These are shown in Figure 21. The four subjects, each of which have more than 5% occurrences, are shown in Table 26. Thus these four subjects account for over half the total. The remaining 14 subjects which include such important management matters as policy formulation, use of statistics, personnel selection, organisation theory, principles of management, motivation, leadership, and decision-making each have 4% or less, and a total of less than 38%.

Bearing in mind that, as shown by this survey, management itself has not been of special interest to municipal engineers (3.197% of all articles are on management), then 4% of 3.197% which is 0.1279% indicates very little interest indeed.

3.3 Number of subjects per article

There are 130 management articles (which are contained in 48 volumes)

	No. of times occurring	%
1. Administration/management	101	34
2. Management techniques	38	13
3. Budgeting	22	7
4. Policy formulation	7	2
5. Work study	25	8
6. Statistics	7	2
7. Operational research	9	3
8. Computers (not in design)	12	4
9. Network analysis (not in design)	7	2
10. Personnel selection	4	1
11. Industrial relations	10	3
12. Organisation theory	2	1
13. Principles of management	7	2
14. Communication	7	2
15. Motivation	9	3
16. Leadership	13	4
17. Decision-making	8	3
18. Social sciences	<u>9</u>	<u>3</u>
Totals	<u>297</u>	<u>97</u>

TABLE 25. Management subjects

	%
administration/management	34
management techniques	13
budgeting	7
work study	<u>8</u>
	<u>62</u>

TABLE 26. Four subjects having over 5% occurrences

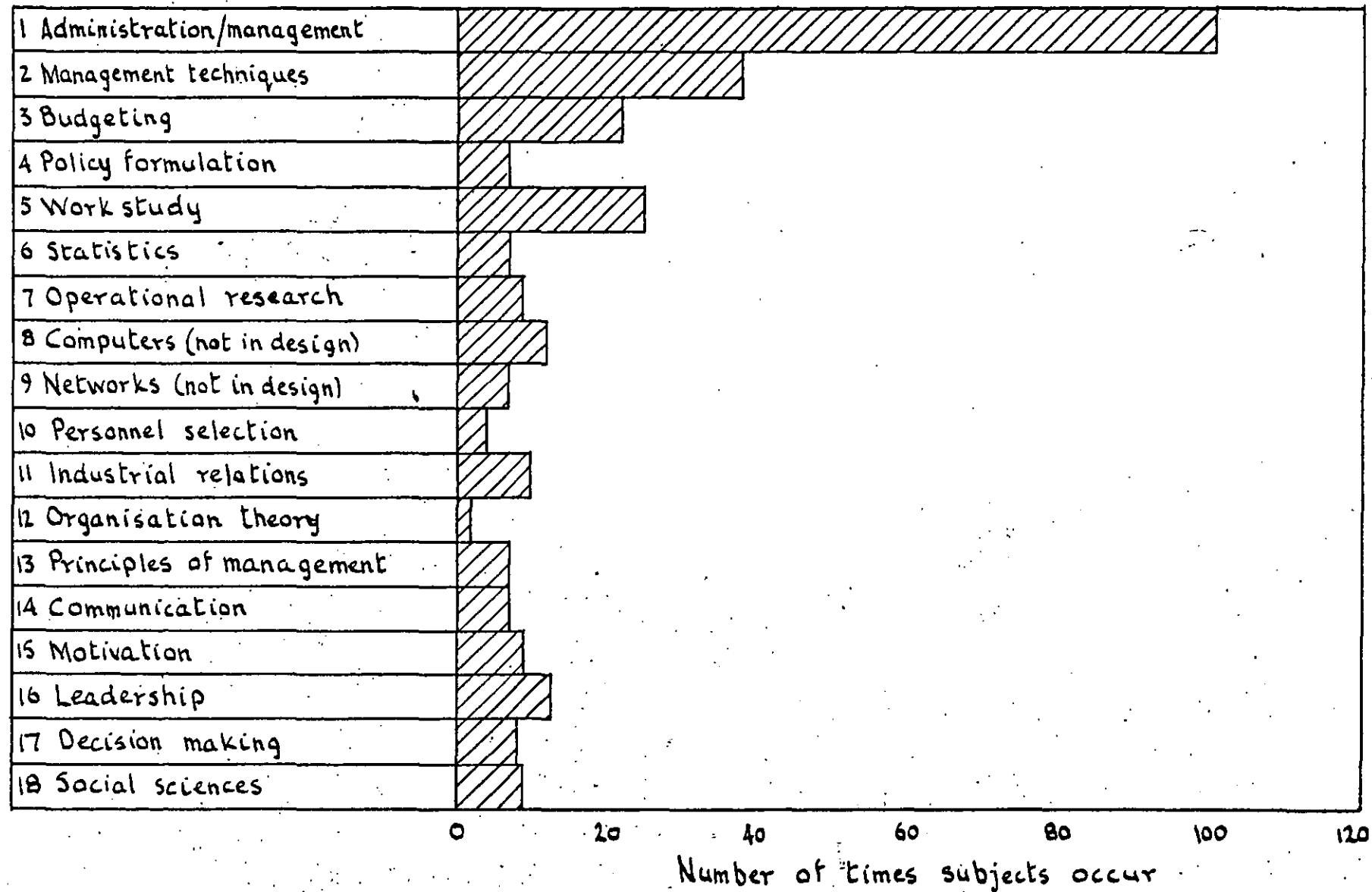


Fig. 20. Frequency of occurrence of management subjects.

These subjects are ranged in order from day-to-day matters to more abstract ones.

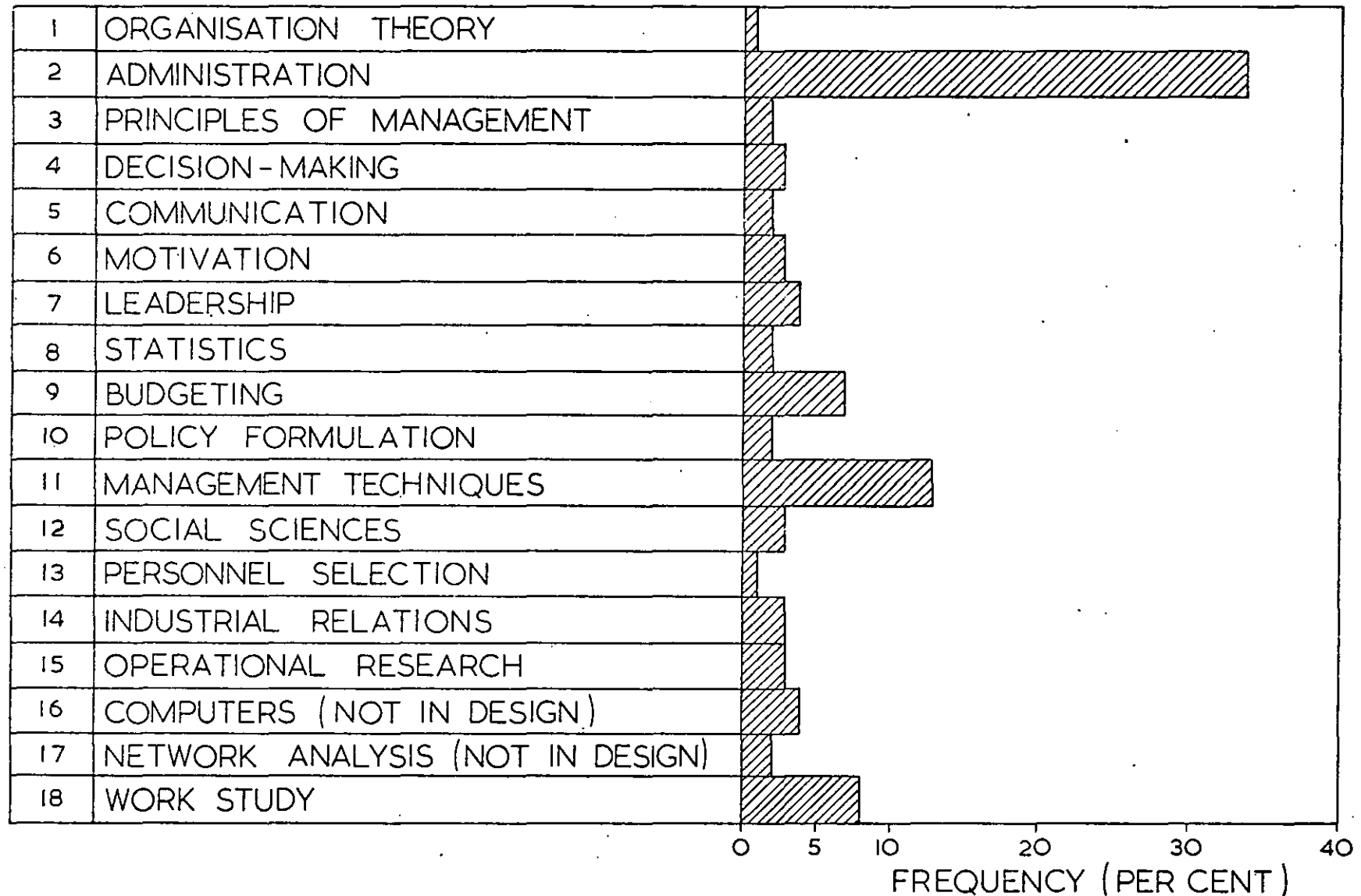


Fig. 21 Frequency of occurrence of management subjects
expressed as a percentage of the whole

and a total of 297 subjects within them, i.e. about 2.28 subjects per article.

The average number of subjects per article per volume is shown at the bottom of Table 22, and these are plotted in Figure 22. The modal average (i.e. that which occurs most frequently) is 1, which occurs 14 times.

The frequency with which the same average occurs is shown in Table 27.

Average No. of Subjects/ Article/Volume	Frequency
1	14
1.5	3
2	9
3	10
4	1
7	1
others	<u>10</u>
	<u>48</u>

TABLE 27. Frequency of occurrence of average number of subjects per article per volume.

3.4 Range of Subjects

It appears from Figure 22 that there is a slight tendency for the number of subjects/article/volume to increase.

It also seems from Table 22 that there is a very much wider range of subjects covered in articles from about 1951 onwards.

The data from Table 22 are shown diagrammatically in Figure 23. As the number of management articles per volume is increasing only slowly, it does appear that the number of subjects per article, and their range is increasing.

There seems to have been a marked increase from volume 79, 1952-53 onwards.

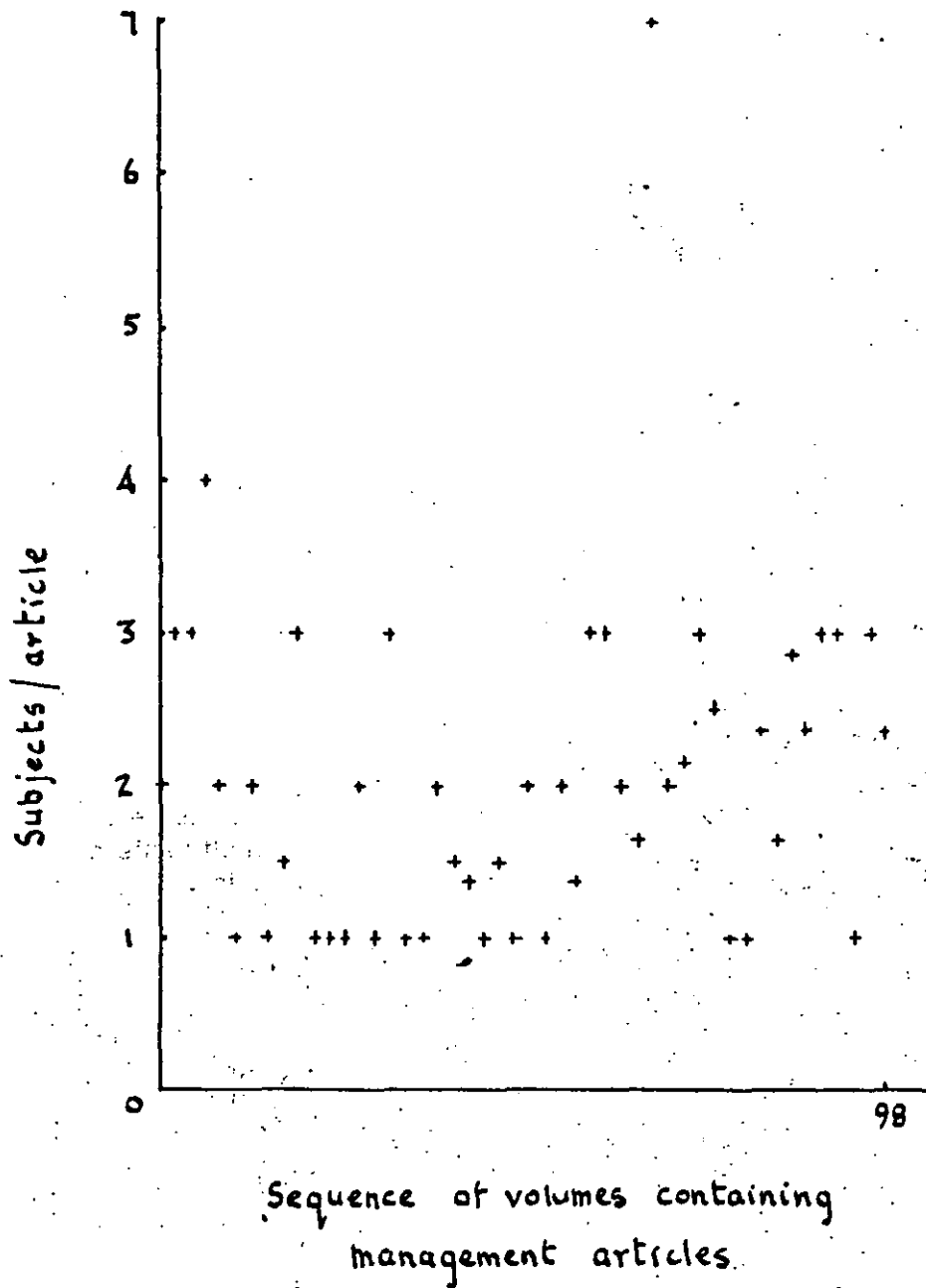


Figure 22 The average number of subjects/article
in each volume

Figure 23

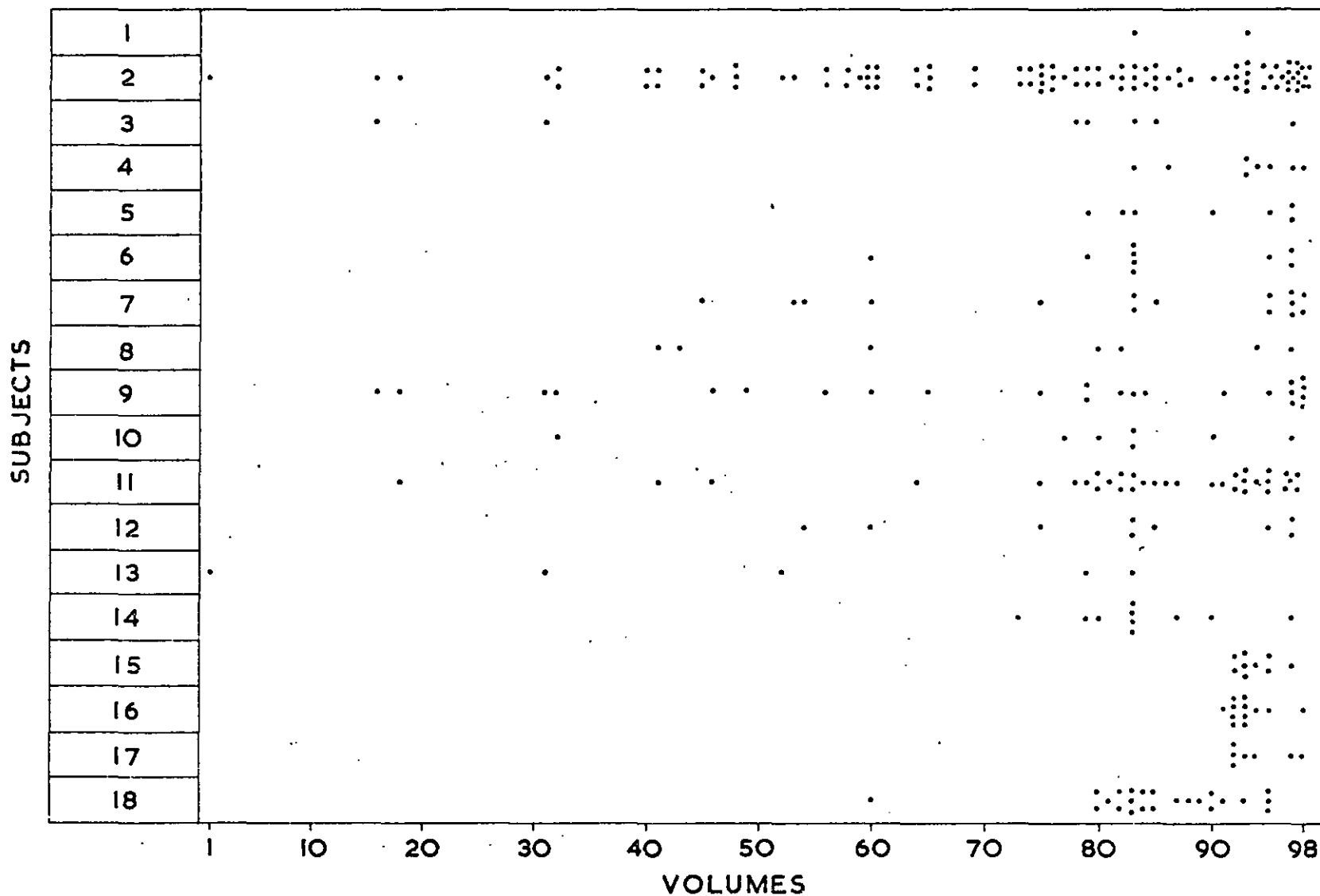


Fig. 23 A diagrammatic representation of Table 22, in which
 each point represents the mention of a subject in an article

3.5 Earliest Occurrences

The first mention of certain subjects has been abstracted from the subject index to articles and is shown in Table 28.

Subject	Volume	Date	Page
1. Principles of management	XVI	1889-90	174
2. Delegation	XVIII	1891-92	169
3. Job specification	XXXI	1904-05	323
4. Statistics, use of	XLI	1914-15	128
5. Principles of organisation	"	"	160
6. Leadership	XLV	1918-19	853
7. Work study	XLVIII	1921-22	157
8. City manager	LII	1925-26	339
9. Behaviour at work	LIV	1927-28	785
10. F.W. Taylor)	LVI	1929-30	276
11. Scientific management)	"	"	276
12. Mary Parker Follet	LXXIV	1947-48	243
13. Urwick)	LXXV	1948-49	820
14. Man-management)	"	"	"
15. Organisation & methods	LXXVIII	1951-52	384
16. Communication)	LXXIX	1952-53	421
17. Line and staff)	"	"	"
18. Gilbreth F.B.)	"	"	"
19. Cost benefit analysis	LXXX	1953-54	265
20. Fayol, Henri)	LXXXIII	1956-57	181
21. Decision-making)	"	"	"
22. Computers (not in design)	91	1964	2
23. Network analysis (not design)	92	1965	191
24. Operational research	92	1965	426
25. Job evaluation	93	1966	109
26. Objectives, setting of,	Conference) Proceedings	1966	69
27. McGregor, Douglas	97	1970	140
28. Planning, programming & budgeting system	98	1971	328

TABLE 28. First mention of certain subjects.

In some of these, the terminology may not be exactly the same in the article as that stated above.

Sometimes the second mention is long after the first, e.g. scientific management is mentioned first in 1929-30; then in 1952-53, then in 1953-54, and finally in 1967.

It should be made clear that these are not necessarily the first mention of a subject in the Journal itself, since references may occur in letters to the editor or in announcements of various kinds and in addresses.

3.6 Index

An index has been prepared of the management articles. It contains 68 cards, some of which are subjects and some are authors such as Follett, McGregor and Urwick. This index is used in preparing material for the Municipal Engineering Management data sheets, and will be made available to the Institution in due course. In the meantime, it is available for engineers to consult via the writer.

3.7 Conclusions

- (i) The management articles concentrate on a narrow field covering administration, techniques, budgeting, and work study.
- (ii) It appears that the number of subjects per article, and their range, is increasing, especially since 1952.

Annex 4. Use of References

4.1 Introduction

Any work should begin from the existing state of knowledge, then add to it. Consequently, one would expect there to be references made in articles to other published information. In this context references include any specific reference in the text to other published material, and include the bibliography to an article.

However, sometimes a quotation is given from a well known author and while this may enhance the article it is not a base upon which the article builds and so such references have been omitted.

Similarly, a passing reference to an Act of Parliament which may indicate where powers are contained have not been included unless they specifically add to the information (as opposed to data) to be found in the article.

Since the volume of published material has increased enormously and is accessible through journals and libraries, one would expect the use of references to become more widespread among authors, and also the number of references per article to increase. References are not always given when appropriate because (a) although some authors do borrow from previous published material, the source is not always acknowledged; (b) some authors may be aware of published material but be unable to identify it and thus use it; (c) authors may not know of the existence of the material; and (d) authors may not know where to look to see if there is any published material on a particular subject.

4.2 Analysis of all the articles

There are 130 articles on management, and the number of references in each of them, listed chronologically are shown in Table 29.

Start →

6	2	0	0	0	1	4	4	0	1
1	0	0	0	0	0	0	0	5	0
0	4	1	1	0	0	3	1	0	0
0	0	2	11	0	7	0	0	0	3
1	0	4	4	0	0	12	1	2	0
4	21	3	0	0	16	0	6	5	10
4	10	5	15	8	0	0	9	0	14
0	1	4	18	8	7	1	0	8	0
2	0	1	0	0	1	5	3	2	3
14	0	2	3	3	8	0	3	7	9
1	0	1	14	21	7	4	4	2	4
0	3	0	1	0	3	2	12	0	4
1	9	10	5	1	3	2	0	2	0

finish

TABLE 29. Number of references in 130 management articles.

These data are shown in Figure 24. Of the 130 articles, 48 cite no references and 82 cite one or more, i.e. 63% cite references which is approximately 2 articles out of every three cite references.

The total number of references is 440 in 82 articles, i.e. an average of 5.4 references per article.

The trend seems to be for there to be fewer articles citing no references at all. There does not appear to be a trend towards more references being cited per article. The most frequently occurring number of references is 1, vide Table 30. The smallest number of references is 1 and the largest is 21.

No. of refs.	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	18	21	Total
Times occurring	17	10	11	12	5	2	4	4	3	3	1	2	3	1	1	1	2	82

TABLE 30. Frequency of occurrence of numbers of references.

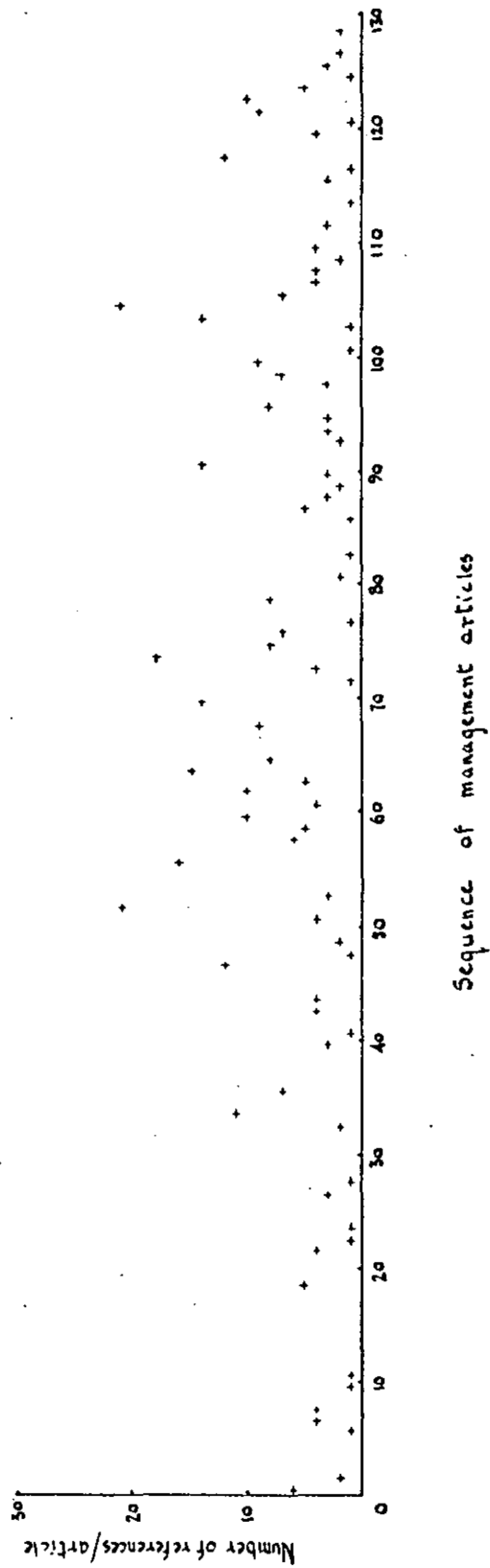


Fig. 24 Number of references/article

Figure 24

No. of refs.in order of frequency:

1; 4; 3; 2; 5; 7 and 8; 9, 10 and 14; 6, 12 and 21;
11, 15, 16 and 18.

4.3 Analysis of the 'best' articles

There are 84 'best' articles. The number of references in each of them, listed chronologically are shown in Table 31.

Start

6	2	0	0	4	4	0	1	0	4
0	3	1	0	0	0	7	4	4	0
0	12	1	2	4	21	3	16	6	5
10	4	5	15	8	9	0	14	0	4
7	1	8	2	1	0	1	5	14	0
3	3	8	0	3	7	9	1	1	14
21	7	4	4	2	4	0	3	0	1
0	3	2	12	0	4	1	9	10	5
1	0	2	0	Finish	-	-	-	-	-

TABLE 31. Number of references in 84 'best' articles.

These data are shown in Figure 25. Of the 84 articles, 21 cite no references and 63 cite one or more; i.e. 75% cite references.

There is a total of 362 references in 63 articles; i.e. 5.75 references per article.

There does not appear to be any trend towards an increasing use of references in these articles.

The most frequently occurring number of references is 4, vide Table 32. The smallest number of references is 1, and the highest is 21.

No. of refs.	1	2	3	4	5	6	7	8	9	10	12	14	15	16	21	Total
Times occurring	11	6	7	12	4	2	4	3	3	2	2	3	1	1	2	63

TABLE 32. Frequency of occurrence of numbers of references in 'best' articles.

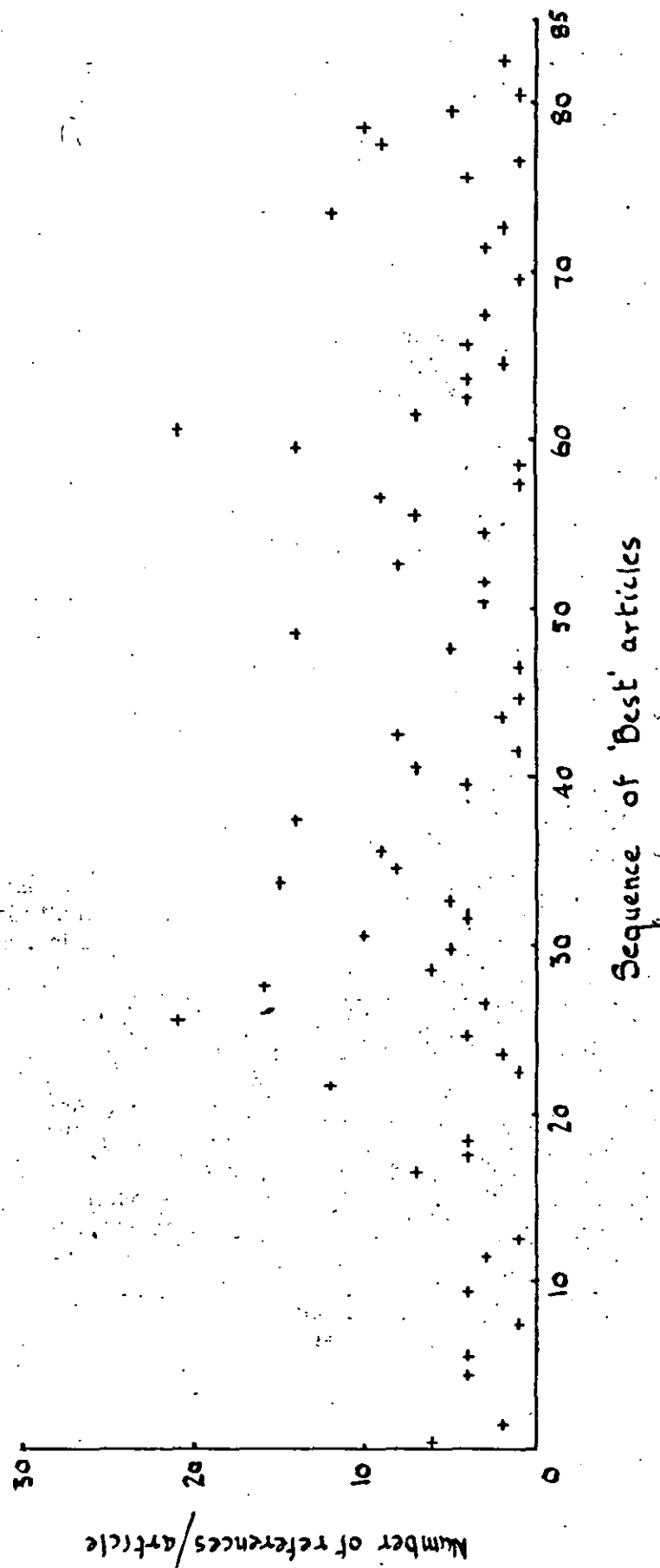


Fig. 25 Number of references / 'Best' article

Figure 25

No. of refs. in order of frequency:

4; 1; 3; 2; 5 and 7; 8, 9 and 14;
6, 10, 12 and 21; 15 and 16.

4.4 Comparison between all articles and the 'best' (vide Table 33)

A higher proportion of 'best' articles cite references, and on average more references are cited per article than in the management articles as a whole. The modal average for the management articles as a whole is 1, and for the 'best' articles is 4 references per article.

No. of refs. per article.	Times occurring		Diff.
	All (130 No.)	'Best' (84 No.)	
0	48	21	27
1	17	11	6
2	10	6	4
3	11	7	4
4	12	12	0
5	5	4	1
6	2	2	0
7	4	4	0
8	4	3	1
9	3	3	0
10	3	2	1
11	1	0	1
12	2	2	0
14	3	3	0
15	1	1	0
16	1	1	0
18	1	0	1
21	2	2	0

TABLE 33. Comparison of numbers of references in all articles and in the 'best' ones.

Of the articles which contained references, the ones considered least interesting (i.e. not 'best') contained on the whole the fewest references. 14 of the 19 articles which are considered less interesting contained up to 3 references each, i.e. well below the average number of references contained in all the articles that have references.

4.5 Authors' use of references

Is there any difference in the use of references between authors of single articles, and authors of several articles?

Author	Use of reference 1st, 2nd, 3rd, 4th paper.			
Anderson	0;	8		
Baxter	4;	4		
Brown	4;	1		
Burrell	3;	5		
Cotton	0;	5		
Elford	0;	3		
Gauntlett	21;	0;	7;	4
Habershon	0;	4	(2nd article with others)	
Hamilton	10;	1		
Hawkins	0;	1		
Kenyon	1;	2;	3	(2nd article with others)
Rayman	3;	1	(1st	" " ")
Ward	3;	4	(1st	" " ")
Wilkes	6;	4	(2nd	" " ")

TABLE 34. Use of references by certain authors.

There are 31 articles by these authors of more than one paper and of these there are 25 papers with references (total references = 112) and there are 6 papers without references (vide Table 34).

Therefore 80% of those papers cite references, which is a higher proportion than that of the 'best' articles.

On the whole these 'prolific' authors are more prone to use references in an article than not. There are 112 references in 25 articles, i.e. an average of 4.48 per article, which is lower than the 'best' articles as a whole, and lower than the total articles with references.

Thus these 'prolific' authors are prone to use fewer references per article than most authors who use references.

4.6 References in Management Articles to earlier articles in the IME Journal

There are 130 articles on management, and the number of references to earlier articles in the IME Journal in each of them, listed chronologically, are shown in Table 35.

Start →

0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	4	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	0
0	0	1	2	0	0	0	0	5	4
1	0	0	1	4	0	0	0	0	0
0	0	0	0	0	0	0	5	0	0
0	2	1	0	0	0	0	0	0	0

Finish

TABLE 35. Number of references in 130 management articles to earlier articles in the IME Journal.

Of the 130 articles, 16 of them contain references to previous articles in the IME Journal; 12 of which 16 occur in the last 43 articles. The use of such references has therefore increased more recently, but is still very low.

No. of refs.	1	2	4	5	Total
Times occurring	9	2	3	2	16

TABLE 36. Frequency of occurrence of numbers of references to earlier articles in the IME Journal.

These results, shown in Table 36, tend to suggest either that relevant material does not exist, or that there are difficulties of access to previously published material. This latter difficulty probably arises

from two causes:

- (i) the non-availability of previous volumes in local authority offices or libraries generally,
- (ii) the inadequate indexing of management subjects in each volume (vide paras 2.1, and 3.6).

4.7 Conclusions

- (i) About two out of three management articles cite references, and there seems to be a trend towards there being fewer articles having no references at all.
- (ii) A higher proportion of those articles considered by the writer on a subjective basis (vide Annex 5, para 5.3) to be the most interesting (the 'best') contain references, than do the management articles as a whole.
- (iii) On average, the 'best' articles cite more references per article than do the management articles as a whole.
- (iv) More of the articles by 'prolific' authors cite references than do the authors of the 'best' articles, but on average the 'prolific' authors cite fewer references per article than do the authors of the 'best' articles.
- (v) The use of references to previously published articles in the Journal is very limited but has increased towards the end of the period examined. It is suggested that it would be useful to publish selected readings from the Journal from 1873 onwards, showing the developing interest in management.

Annex 5. The Management Articles - Authors and Subjects

5.1 Number of management articles per author

From the author index which follows (pages 170 to 179) it may be seen that: 1 author has 4 papers (H.D. Gauntlett)
1 author has 3 papers (J.A. Kenyon)
12 authors have 2 papers (see below); and the remainder have one article each. It should be noted that in several cases authors have collaborated to write a paper.

The authors with two papers are: Anderson, Baxter, Brown, Burrell, Cotton, Elford, Habershon, Hamilton, Hawkins, Rayman, Ward and Wilkes.

The number of papers shared by two authors is 8

" " " " " "three" " 2
10

The number of papers by single authors is 120

There are 143 authors who between them have contributed the total of 130 papers

5.2 Time-lapse between management articles

Author	Volumes			Spanning (years)
Gauntlett	1951-52	1966	1966 1968	15 - 0 - 2
Kenyon	1958	1960(joint)	1968	2 - 8
Anderson	1962	1966		4
Baxter	1947-48	1950-51		3
Brown	1913-14	1916-17		3
Burrell	1970	1970		0
Cotton	1948-49	1963		15
Elford	1904-05	1933-34		29
Habershon	1955-56	1957 (joint)		2
Hamilton	1955-56	1961		6
Hawkins	1968	1970		2
Rayman	1965 (joint)	1966		1
Ward	1965 (joint)	1968		3
Wilkes	1953-54	1957 (joint)		4

TABLE 37. Distribution of articles by certain authors.

If one includes all the authors, the most frequently occurring period between articles (vide Table 37) is two years (four times). If one looks only at authors with two articles, the most frequently occurring period between articles is three years.

If one includes all 14 authors, a period between articles of 2, 3 or 4 years occurs 9 times in 17 periods.

A period of 15 years between papers occurs twice, but all other periods occur once only.

There is a clear tendency therefore for authors who write a second, third or fourth paper to do so within 2 to 4 years of writing the first. It should be borne in mind that these (and other) authors may have written papers on subjects other than management.

It should also be borne in mind that these authors may have written papers on management subjects which have been published in other journals.

5.3 The 'best' management articles

In the opinion of the writer, many of the articles contain interesting material which should be made available to present generation engineers, a few are very good indeed, and a few are very poor. Of the 130 total management articles, 84 are interesting now, and 46 are not. It is acknowledged that these judgements are subjective.

5.4 Number of 'best' articles per author

From the 'best' author index it may be seen that:

1 author has four papers (Gauntlett)

1 " " three " (Kenyon)

9 authors have two papers (see below)

and the remainder have 1 article each.

It should be noted that in several cases authors have collaborated

to write a paper. The authors with two papers are: Anderson, Baxter, Burrell, Cotton, Elford, Hawkins, Rayman, Ward and Wilkes.

The number of papers shared by two authors is 5

" " " " " " three " " 2

" " " " by a single author is 77
84

Two authors sharing a paper are:

Berry & Davies; Brokenshire & Reynolds;

Hedges & Schofield; Tully & Phillips; Rayman & Ward.

Three authors sharing a paper are:

Habershon, Law and Wilkes;

Kenyon, Robertson and Lancaster.

93 authors have collaborated to produce 84 papers.

There are 84 'best' papers out of a total of 130 management papers (64.61%).

5.5 List of Management Articles in Chronological Order (i.e. date of publication)

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Angell, Lewis	Administration of the Sanitary Laws.	I p.221	6	-	Yes
Hookey, E. Purnell	Maintenance of main roads and county management	XVI p. 174	2	-	Yes
Robinson, James	County management of main roads.	XVIII p.169	-	-	No
Elford, Ernest, J.	Administration by municipal engineers.	XXXI p.323	-	-	Yes
Burns, John, The Rt. Hon., M.P.	Address	XXXII p.213	-	-	Yes
Campbell, A.H.	Notes on the carrying out of public works departmentally.	XXXII p.373	1	-	No
Brown, Reginald	Administration	XL p.351, 405, 534, 634, 858	4	-	Yes
Swarbrick, J.	Future municipal government of large cities.	XL P.464	4	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Hawkins, J. Fred	Control, management and maintenance of rural roads	XLI p.128	-	-	Yes
Willis, Edward	Notes on the organisation of a municipal engineer's department	XLI p.160	1	1	Yes
Brown, Reginald	Diagrammatic statistics for municipal engineers	XLIII p.31	1	-	No
Booth, E.Witton	Administration of the Household Fuel & Lighting Order October 1918	XLV p.261	-	-	No
Forbes, Lt.Col.A.	Brief survey of the road organisation in France	XLV p.853	-	-	No
Hill, J.	The Hollerith system of accountancy and its application to public works accounts	XLVI p.219	-	-	No
Goodacre, E.J.	Economy applied to municipal engineering	XLVIII p.157	-	-	No
Haller, J.C.	The system of costing in connection with highway construction and maintenance	XLVIII p.356	-	-	Yes
Imrie, R.D.	Highway costs accounts	XLVIII p.630	-	-	No
Whyatt, H.Gilbert	The economics of interest on and repayment of loans	XLIX p.480	-	-	No
Davis, E.F.	An engineer's survey of municipal administration	LII p.339	5	-	No
Begg, George	Contract & departmental work for municipal undertakings	LIII p.388	-	-	No
Davies, B.Price	Organisation of highways work	LIV p.785	-	-	No
Leitch, P.A.	Recording costs of construction work	LVI p.276	4	-	Yes
Barry, George S.	Impending changes in Scottish highways administration	LVI p.1077	1	-	No
Lintern, H.R.	Considerations affecting highway department organisation	LVIII p.1031	1	-	No
Elliott, D.B.	Wayside musings: a plea for standardisation of local government methods	LVIII p.1667	-	-	No
Floyd, T.B.	Kroonstad roads with special reference to output data	LIX p.407	-	-	Yes
Elford, E.J.	Notes on local government administration with special reference to the engineer & surveyor's department	LX p.100	3	-	Yes
Mactavish, Duncan, M.	The economics of public cleansing	LX p.157	1	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Lewis, V.E.	Municipal engineering, finance and accounting	LX p.558	-	-	Yes
Hamlin, E.J.	Administration of a city engineer's office	LX p.581	-	-	Yes
Tasker, E.	Office efficiency in a high-ways department	LX p.1302	-	-	Yes
Tait, P	Control over highway expenditure	LX p.1362	-	-	No
Drury, J.W.	The advantages of sound costing as applied to public cleansing operations	LXIV p.960	2	-	No
Knight, H.S.L.	Highway administration and the lesson of the Reichsautobahn	LXIV p.1968	11	4	No
Crossey, S.D.	Costing for the municipal engineer	LXV p.213	-	-	No
Cave, F.J.	The Borough Surveyor - an outline of his powers and duties	LXV p.964	7	-	Yes
Whitaker, E.C.	Controlled works expenditure	LXV p.1156	-	-	No
Morris, W.	War-time duties of the Hull city engineer & surveyor	LXIX p.97	-	-	No
Wooller, A.T.	Reorganisation of local government with particular regard to services controlled by a Borough Engineer in Greater London	LXIX p.429	-	-	No
Finch, R.M.	Welfare & rehabilitation in a surveyor's dept.	LXXIII p.129	3	-	No
Taylor, F.W.	Unit costing for civil engineering work	LXXIII p.209	1	-	No
MacMahon, T.	A costing system for local authority engineering works	LXXIV p.163	-	-	No
Baxter, R.G.	The engineer-technician-administrator in local government: his education and training.	LXXIV p.243	4	-	Yes
Harrison, W.A.	The question of direct labour	LXXV p.121	4	-	Yes
Thorne, S.F.	The organisation, administration and records of a municipal engineer's dept.	LXXV p.203	-	-	Yes
Cotton, J.C.	Costing as applied to a municipal engineer's dept	LXXV p.382	-	-	Yes
Bacon, S.G.	Human factors in man management	LXXV p.820	12	-	Yes
Patterson, F.N.B.	Payment by results on direct labour housing	LXXVI p.285	1	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Purcell, Cllr.George	The relations between officer & committee: a talk to junior officers in local government	LXXVI p.371	2	-	Yes
Muse, A.W.	Costing for a highways dept.	LXXVI p.441	-	-	No
Baxter, R.G.	Policy, administration and the engineer	LXXVII p.541	4	-	Yes
Gauntlett, H.D.	Enquire within alias O & M	LXXVIII p.384	21	-	Yes
Short, G.S.	The contractual relationships of a local authority	LXXVIII p.481	3	-	Yes
Carnegie, R.B.	Central repair depot Devon county council - Notes on policy and administration	LXXIX p.159	-	-	No
Whalley, G.	Costing and cost control in a municipal engineer's dept.	LXXIX p.227	-	-	No
Sibley, F.O.	Management of public works	LXXIX p.421	16	-	Yes
Wicks, H.E.J.	The costing section, Borough surveyor & water engineer's dept, Borough of Royal Tunbridge Wells.	LXXIX p.444	-	-	No
Wilkes, J.H.H.	The municipal engineer and modern life	LXXX p.107	6	-	Yes
Morris, S.S.	Problems of progress	LXXX p.265	5	-	Yes
Leeming, J.J.	Statistical methods	LXXX p.509	10	-	Yes
Berry, G and Davies, P.L.	Organisation & methods	LXXXI p.280	4	-	Yes
Hamilton, A.S.	The evolution of municipal engineering	LXXXII p.52	10	-	No
Parkinson, E.W.	The duties of the assistant engineer	LXXXII p.159	5	1	Yes
Williams, C.V.	A review of highway administration	LXXXII p.293	15	-	Yes
Doull, J.G.	The statistical approach	LXXXII p.345	8	1	Yes
Habershon, M.E.	Work study, costing, and bonusing	LXXXII p.451	-	-	No
Evans, J.T.	Walsall cleansing service bonus scheme	LXXXII p.454	-	-	No
Watson, D.	The impact of full employment on the work of the local government engineer & surveyor	LXXXIII p.64	9	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Melling, C.T.	Management & human relations	LXXXVIII p.175	-	-	Yes
Turner, A.S.	Essentials for a modern engineer	LXXXVIII p.181	14	-	Yes
Fogg, A.H.	Administration & controls	LXXXVIII p.357	-	-	Yes
Stockley, N.H.	Economy in municipal engineering	84 p.29	1	-	No
Habershon, M.E.	Work Study	84 p.121	4	-	Yes
Law, W.M. & Wilkes, J.H.H.					
Brierley, J.	The social & economic justification of a road plan for Gt. Britain	84 p.133	18	-	No
Nelson, J.R.	A county borough engineer's & a county surveyor's dept: their organisation compared	85 p.148	8	-	No
Needham, C.	Duties & service conditions of municipal engineers at home & abroad - a comparison	85 p.194	7	-	Yes
Kenyon, J.A.	Manpower & work study in municipal engineering	85 p.278	1	-	Yes
Chanter, A.J.	Work study & incentives	85 p.327	-	-	No
Reynolds, D.J.	Economics of road improvement	86 p.9	8	-	Yes
Thackray, P.J.	Development control. The operation of delegated powers in a rural district	87 p.17	-	-	No
Kenyon, J.A. Robertson, L.R. Lancaster, F.J.	Work study. Some applications in municipal and county engineering.	87 p.257	2	-	Yes
Moore, J.N. Bowness, J.H.	Work study in the U.D. of Dorking	88 p.88	-	-	No
Hamilton, A.S.	Engineers ask: where would RIBA's 'separate department' scheme end?	88 p.95	1	-	Yes
Anderson, O.C.	Incentive bonus schemes	89 p.431	-	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Sewell, G.E. Clahane, R.	Work study application	90 p.45	-	-	No
Foster, H.	Local authority committee work	90 p.65	1	-	Yes
Cotton, J.C.	Improving efficiency by method study applied to direct labour work	90 p.305	5	-	Yes
Oliver, E.G.W.	Computer programming for engineers.	91 p.2	3	1	No
East, E.W. Gosling, V.	Work study & incentive bonus as applicable to refuse collection and disposal at Worthing.	91 p.53	2	1	No
Jenner, H.N.	Financial & administrative relationships between county & county district councils.	91 p.117	3	-	No
Hedges, R.R. Schofield, R.B.	Construction planning - with particular reference to network analysis.	92 p.191	14	-	Yes
Pearson, Sir Denning	Application of modern management & organisational techniques to engineering activities.	92 p.306	-	-	Yes
Nottage, R.	Operational research and local government.	92 p.426	2	1	No
Rayman, N. Ward, R.A.	Operational research in municipal engineering with reference to work carried out in Coventry.	92 p.428	3	2	Yes
Tully, J.R. Phillips, M.E.	Critical path analysis applied to the work of a county engineer's dept.	92 p.436	3	-	Yes
Anderson, O.C.	Managerial & professional job evaluation in the local government field.	93 p.109	8	-	Yes
Gauntlett, H.D.	The new environment of the municipal engineer.	93 p.163	-	-	Yes
Mellors, P.E.	Basic appreciation of computers, for engineers.	93 p.166	3	-	Yes
Gauntlett, H.D.	Computers harnessed to municipal engineering.	93 p.172	7	5	Yes
Lawson, Hugh, McD.	The contribution of the municipal engineer to local government.	Conf. Proc. 1966 p.59	9	4	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Rayman, N.	The part of the municipal engineer in the development of new management techniques.	Conf. Proc. 1966 p. 69	1	1	Yes
Heal, A.	Refuse collection & incentive payments.	93 p.284	-	-	No
Walraven, Ir.A.Van	Function & organisation of the Public Works dept. of the city of Amsterdam.	93 p.389	1	-	Yes
Case, L.	Cost benefit analysis of roadworks.	94 p.315	14	1	Yes
Sharpe, D.E.	Operational research in municipal engineering.	94 p.373	21	4	Yes
Bugher, R.D.	The role of the engineer in local government in the USA.	95 p.38	7	-	Yes
Gauntlett, H.D.	Management communications.	95 p.150	4	-	Yes
Ward, R.A.	Operational inventions are equivalent to technical inventions.	Conf. Proc. 1968 p.68	4	-	Yes
Pickford, K.S.	The application of work study in a highway engineer's dept.	95 p.248	2	-	Yes
Cooper, D.F.	Purchasing, stock turn and control	95 p.300	4	-	Yes
Hawkins, M.R.	Budgetary control in a public works dept.	95 p.305	-	-	Yes
Kenyon J.A.	Productivity & management	95 p.328	3	-	Yes
Harvey, N.	Building control productivity	96 p.267	-	-	Yes
Martin, B.V.	Financial priorities	97 p.54	1	-	Yes
Fairweather, D.A.	Finance & the engineer	97 p.129	-	-	Yes
Burrell, J.J.	Legal & administration	97 p.136	3	-	Yes
Peverel-Cooper J.	Engineering management techniques at third tier level.	97 p.140	2	-	Yes
Mustow, S.N.	The engineer - a manager?	97 p.158	12	5	Yes
Atkinson, C.R.	Reorganisation procedures now in operation under The Bradford Plan.	Conf. Proc. 1970 p.103	-	-	Yes
Schofield, H.	Organisation of technical services past, present and future.	Conf. Proc. 1970 p.107	4	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Hawkins, M.R.	Torbay County Borough: an exercise in local government reorganisation.	Conf. Proc. 1970 p.112	1	-	Yes
Martin, A.S.	An introduction to management in municipal engineering.	97 p.216	9	2	Yes
Richardson, T.R.	The engineer as a manager.	97 p.323	10	1	Yes
Burrell, J.J.	The conduct of meetings.	97 p.329	5	-	Yes
Brokenshire, P. & Reynolds, D.C.	Design cost targeting for engineering schemes	98 p.63	1	-	Yes
Barnes, S.R.	The work of IAMSAC	Conf. Proc. 1971 p.106	3	-	No
Harrison, W.C.S.	An introduction to the Report of the Marshall committee on Highway maintenance.	Conf. Proc. 1971 p.108	2	-	No
Nicholson, T.H.	Steps towards planned programme budgeting.	98 328	-	-	Yes
Gee, R.L.	Local government reorganisation and the municipal engineer - lessons from London.	98 p.334	2	-	Yes
Crossland, P.G.	The place of the municipal engineer in the management of a new-style local authority.	98 p.337	-	-	Yes

5.6 List of management articles in Authors' Alphabetical Order

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Anderson, O.C.	Incentive bonus schemes	89 p.431	-	-	Yes
Anderson O.C.	Managerial & professional job evaluation in the local government field.	93 p.109	8	-	Yes
Angell Lewis	Administration of the Sanitary Laws	1 p.221	6	-	Yes
Atkinson C.R.	Reorganisation procedures now in operation under The Bradford Plan	Conf. Proc. 1970 p.103	-	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Bacon, S.G.	Human factors in man management	LXXV p.820	12	-	Yes
Barnes, S.R.	The Work of IAMSAC.	Conf. Proc. 1971 p.106	3	-	No
Barry, George, S.	Impending changes in Scottish highways administration.	LVI p.1077	1	-	No
Baxter, R.G.	The engineer-technician-administrator in local government: his education and training.	LXXIV p.243	4	-	Yes
Baxter, R.G.	Policy, administration and the engineer.	LXXVII p.541	4	-	Yes
Begg, George.	Contract & departmental work for municipal undertakings.	LIII p.388	-	-	No
Berry, G. and Davies P.L.	Organisation and methods	LXXXI p.280	4	-	Yes
Booth, E.Witton.	Administration of the Household Fuel & Lighting Order October 1918.	XLV p.261	-	-	No
Moore, J.N. Bowness, J.H.	Work study in the U.D. of Dorking.	88 p.88	-	-	No
Brierley, J.	The social & economic justification of a road plan for Gt. Britain.	84 p.133	18	-	No
Brokenshire, P. Reynolds, D.C.	Design cost targeting for engineering schemes.	98 p.63	1	-	Yes
Brown, Reginald.	Administration.	XL p.351, 405, 534, 634, 858.	4	-	Yes
Brown, Reginald.	Diagrammatic statistics for municipal engineers.	XLIII p.31	1	-	No
Bugher, R.D.	The role of the engineer in local government in the USA.	95 p.38	7	-	Yes
Burns, John The Rt.Hon. M.P.	Address	XXXII p.213	-	-	Yes
Burrell, J.J.	Legal & administration	97 p.136	3	-	Yes

Author	Title of Article	Volume	References		'Best' Articles
			Gen	IME	
Burrell, J.J.	The conduct of meetings.	97 p.329	5	-	Yes
Campbell, A.H.	Notes on the carrying out of public works departmentally.	XXXII P.373	1	-	No
Carnegie, R.B.	Central repair depot Devon county council - Notes on policy and administration.	LXXIX p.159	-	-	No
Case, L.	Cost benefit analysis of roadworks.	94 p.315	14	1	Yes
Cave, F.J.	The Borough Surveyor - an outline of his powers and duties	LXV p.964	7	-	Yes
Chanter, A.J.	Work study & incentives	85 p.327	-	-	No
Sewell, G.E. <u>Clahane</u> , R.	Work study application	90 p.45	-	-	No
Cooper, D.F.	Purchasing, stock turn and control.	95 p.300	4	-	Yes
Cotton, J.C.	Costing as applied to a municipal engineer's dept.	LXXV p.382	-	-	Yes
Cotton, J.C.	Improving efficiency by method study applied to direct labour work.	90 p.305	5	-	Yes
Crossey, S.D.	Costing for the municipal engineer.	LXV p.213	-	-	No
Crossland, P.G.	The place of the municipal engineer in the management of a new-style local authority.	98 p.337	-	-	Yes
Davies, B.Price	Organisation of highways work.	LIV p.785	-	-	No
Berry, G. and <u>Davies</u> , P.L.	Organisation & methods	LXXXI p.280	4	-	Yes
Davis, E.F.	An engineer's survey of municipal administration.	LII p.339	5	-	No
Doull, J.G.	The statistical approach	LXXXII p.345	8	1	Yes
Drury, J.W.	The advantages of sound costing as applied to public cleansing operations.	LXIV p.960	2	-	No

Author	Title of Article	Volume	References		'Best' Articles
			Gen	IME	
East, E.W. Gosling, V.	Work study & incentive bonus as applicable to refuse collection and disposal at Worthing.	91 p.53	2	1	No
Elford, Ernest J.	Administration by municipal engineers.	XXXI p.323	-	-	Yes
Elford,	Notes on local government administration with special reference to the engineer & surveyor's department.	LX p.100	3	-	Yes
Elliott, D.B.	Wayside musings: a plea for standardisation of local government methods.	LVIII p.1667	-	-	No
Evans, J.T.	Walsall cleansing service bonus scheme.	LXXXII p.454	-	-	No
Fairweather, D.A.	Finance & the engineer	97 p.129	-	-	Yes
Finch, R.M.	Welfare & rehabilitation in a surveyor's dept.	LXXIII p.129	3	-	No
Floyd, T.B.	Kroonstad roads with special reference to output data.	LIX p.407	-	-	Yes
Fogg, A.H.	Administration & controls.	LXXXIII p.357	-	-	Yes
Forbes, Lt.Col.A.	Brief survey of the road organisation in France.	XLV p.853	-	-	No
Foster, H.	Local authority committee work	90 p.65	1	-	Yes
Gauntlett, H.D.	Enquire within alias O & M.	LXXVIII p.384	21	-	Yes
Gauntlett, H.D.	The new environment of the municipal engineer.	93 p.163	-	-	Yes
Gauntlett, H.D.	Computers harnessed to municipal engineering.	93 p.172	7	5	Yes
Gauntlett, H.D.	Management communications.	95 p.150	4	-	Yes
Gee, R.L.	Local government reorganisation and the municipal engineer - lessons from London.	98 p.334	2	-	Yes
Goodacre, E.J.	Economy applied to municipal engineering.	XLVIII p.157	-	-	No
East, E.W. Gosling, V.	Work study & incentive bonus as applicable to refuse collection and disposal at Worthing.	91 p.53	2	1	No

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Habershon, M.E.	Work study, costing, and bonusing.	LXXXII p.451	-	-	No
Habershon, M.E., Law, W.M. and Wilkes, J.H.H.	Work study.	84 p.121	4	-	Yes
Haller, J.C.	The system of costing in connection with highway construction and maintenance.	XLVIII p.356	-	-	Yes
Hamlin, E.J.	Administration of a city engineer's office.	LX p.581	-	-	Yes
Hamilton, A.S.	The evolution of municipal engineering.	LXXXII p.52	10	-	No
Hamilton, A.S.	Engineers ask: where would RIBA's 'separate department' scheme end?	88 p.95	1	-	Yes
Harrison, W.A.	The question of direct labour.	LXXV p.121	4	-	Yes
Harrison, W.C.S.	An introduction to the Report of the Marshall committee on Highway maintenance.	Conf. Proc. 1971 p.108	2	-	No
Harvey, N.	Building control productivity.	96 p.267	-	-	Yes
Hawkins, J.Fred	Control, management and maintenance of rural roads.	XLI p.128	-	-	Yes
Hawkins, M.R.	Budgetary control in a public works dept.	95 p.305	-	-	Yes
Hawkins, M.R.	Torbay County Borough: an exercise in local government reorganisation.	Conf. Proc. 1970 p.112	1	-	Yes
Heal, A.	Refuse collection & incentive payments.	93 p.284	-	-	No
Hedges, R. & Schofield, R.B.	Construction Planning - with particular reference to network analysis.	92 p.191	14	-	Yes
Hill, J.	The Hollerith system of accountancy and its application to public works accounts.	XLVI p.219	-	-	No
Hooley, E.Purnell	Maintenance of main roads and county management	XVI p.174	2	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Imrie, R.D.	Highway costs accounts.	XLVIII p.630	-	-	No
Jenner, H.N.	Financial & administrative relationships between county & county district councils.	91 p.117	3	-	No
Kenyon, J.A.	Manpower & work study in municipal engineering.	85 p.278	1	-	Yes
Kenyon, J.A., Robertson, L.R. Lancaster, F.J.	Work study. Some applications in municipal and county engineering.	87 p.257	2	-	Yes
Kenyon, J.A.	Productivity & management	95 p.328	3	-	Yes
Knight, H.S.L.	Highway administration and the lesson of the Reichsautobahn.	LXIV p.1968	11	4	No
Kenyon, J.A., Robertson, L.R. and Lancaster, F.J.	Work study. Some applications in municipal and county engineering.	87 p.257	2	-	Yes
Habershon, M.E., Law, W.M. and Wilkes, J.H.H.	Work study.	84 p.121	4	-	Yes
Lawson, Hugh, McD.	The contribution of the municipal engineer to local government.	Conf. Proc. 1966 p.59	9	4	Yes
Leeming, J.J.	Statistical methods.	LXXX p.509	10	-	Yes
Leitch, P.A.	Recording costs of construction work.	LVI p.276	4	-	Yes
Lewis, V.E.	Municipal engineering, finance and accounting.	LX p.558	-	-	Yes
Lintern, H.R.	Considerations affecting highway department organisation.	LVIII p.1031	1	-	No

Author	Title of Article	Volume	References		'Best' Articles
			Gen	IME	
MacMahon, T.	A costing system for local authority engineering works.	LXXIV p.163	-	-	No
MacTavish, Duncan, M.	The economics of public cleansing.	LX p.157	1	-	Yes
Martin, A.S.	An introduction to management in municipal engineering.	97 p.216	9	2	Yes
Martin, B.V.	Financial priorities.	97 p.54	1	-	Yes
Melling, C.T.	Management & human relations.	LXXXIII p.175	-	-	Yes
Mellors, E.	Basic appreciation of computers, for engineers.	93 p.166	3	-	Yes
Moore, J.N.	Work study in the U.D. of Dorking.	88 p.88	-	-	No
Bowness, J.H.					
Morris, S.S.	Problems of progress	LXXX p.265	5	-	Yes
Morris, W.	War-time duties of the Hull city engineer & surveyor.	LXIX p.97	-	-	No
Muse, A.W.	Costing for a highways dept.	LXXVI p.441	-	-	No
Mustow, S.H.	The engineer - a manager?	97 p.158	12	5	Yes
Needham, C.	Duties & service conditions of municipal engineers at home & abroad - a comparison.	85 p.194	7	-	Yes
Nelson, J.R.	A county borough engineer's, & a county surveyor's dept: their organisation compared.	85 p.148	8	-	No
Nicholson, T.H.	Steps towards planned programme budgeting.	98 p.328	-	-	Yes
Nottage, R.	Operational research and local government.	92 p.426	2	1	No
Oliver, E.G.W.	Computer programming for engineers.	91 p.2	3	1	No
Parkinson, E.W.	The duties of the assistant engineer.	LXXXII p.159	5	1	Yes
Patterson, F.N.B.	Payment by results on direct labour housing.	LXXVI p.285	1	-	Yes
Pearson, Sir Denning	Application of modern management & organisational techniques to engineering activities.	92 p.306	-	-	Yes

Author	Title of Article	Volume & page	References		'Best' Articles
			Gen	IME	
Peverel-Cooper, J.	Engineering management techniques at third tier level.	97 p.140	2	-	Yes
Tully, J.R. & Phillips, M.E.	Critical path analysis applied to the work of a county engineer's dept.	92 p.436	3	-	Yes
Pickford, K.S.	The application of work study in a highway engineer's dept.	95 p.248	2	-	Yes
Purcell, Cllr.George	The relations between officer & committee: a talk to junior officers in local government.	LXXVI p.371	2	-	Yes
Rayman, N. & Ward, R.A.	Operational research in municipal engineering with reference to work carried out in Coventry.	92 p.428	3	2	Yes
Rayman, N.	The part of the municipal engineer in the development of new management techniques.	Conf. Proc. 1966 p.69	1	1	Yes
Brokenshire, P. & Reynolds, D.C.	Design cost targeting for engineering schemes.	98 p.63	1	-	Yes
Reynolds, D.J.	Economics of road improvement.	86 p.9	8	-	Yes
Richardson, T.R.	The engineer as a manager.	97 p.323	10	1	Yes
Kenyon, J.A., Robertson, L.R. & Lancaster, F.J.	Work study. Some applications in municipal and county engineering.	87 p.257	2	-	Yes
Robinson, James.	County management of main roads.	XVIII p.169	-	-	No
Schofield, H.	Organisation of technical services past, present and future.	Conf. Proc. 1970 p.107	4	-	Yes
Hedges, R.R. & Schofield, R.B.	Construction Planning - with particular reference to network analysis.	92 p.191	14	-	Yes
Sewell, G.E. & Clahane, R.	Work study application.	90 p.45	-	-	No
Sharpe, D.E.	Operational research in municipal engineering.	94 p.373	21	4	Yes

Author	Title of Article	Volume & page	Reference		'Best' Articles
			Gen	IME	
Short, G.S.	The contractual relationships of a local authority.	LXXVIII P.481	3	-	Yes
Sibley, F.O.	Management of public works.	LXXIX p.421	16	-	Yes
Stockley, N.H.	Economy in municipal engineering.	84 p.29	1	-	No
Swarbrick, J.	Future municipal government of large cities.	XL p.464	4	-	Yes
Tait, P.	Control over highway expenditure.	LX p.1362	-	-	No
Tasker, E.	Office efficiency in a highways department.	LX p.1302	-	-	Yes
Taylor, F.W.	Unit costing for civil engineering work.	LXXIII p.209	1	-	No
Thackray, P.J.	Development control. The operation of delegated powers in a rural district.	87 p.17	-	-	No
Thorne, S.F.	The organisation, administra- tion and records of a municipal engineer's dept.	LXXV p.203	-	-	Yes
<u>Tully</u> , J.R., & Phillips, M.E.	Critical path analysis applied to the work of a county engineer's dept.	92 p.436	3	-	Yes
Turner, A.S.	Essentials for a modern engineer.	LXXXIII p.181.	14	-	Yes
Walraven, Ir.A.Van	Function & organisation of the Public Works dept. of the city of Amsterdam.	93 p.389	1	-	Yes
Rayman, N. & <u>Ward</u> , R.A.	Operational research in municipal engineering with reference to work carried out in Coventry.	92 p.428	3	2	Yes
Ward, R.A.	Operational inventions are equivalent to technical inventions.	Conf. Proc. 1968 p.68	4	-	Yes
Watson, D.	The impact of full employment on the work of the local government engineer & surveyor.	LXXXIII p.64	9	-	Yes
Whalley, G.	Costing and cost control in a municipal engineer's dept.	LXXIX p.227	-	-	No
Whitaker, E.C.	Controlled works expenditure.	LXV p.1156	-	-	No

Author	Title of Article	Volume & page	Reference		'Best' Articles
			Gen	IME	
Whyatt, H.Gilbert.	The economics of interest on & repayment of loans.	XLIX p.480	-	-	No
Wicks, H.E.J.	The costing section, Borough surveyor & water engineer's dept, Borough of Royal Tunbridge Wells.	LXXIX p.444	-	-	No
Wilkes, J.H.H.	The municipal engineer and modern life.	LXXX p.107	6	-	Yes
Habershon, M.E., Law, W.M. & Wilkes, J.H.H.	Work study.	84 p.121	4	-	Yes
Williams, C.V.	A review of highway administration.	LXXXII p.293	15	-	Yes
Willis, Edward.	Notes on the organisation of a municipal engineer's department.	XLI p.160	1	1	Yes
Wooller, A.T.	Reorganisation of local government with particular regard to services controlled by a Borough Engineer in Greater London.	LXIX p.429	-	-	No

The reader is invited to return to the Overview, para 2.3, page 125, and having read it, and the conclusions on the Survey, to proceed to Appendix 3.

Appendix 3. The Institution of Municipal Engineers

The syllabus (October 1971)

WRITTEN EXAMINATION IN
MANAGEMENT
AND PUBLIC ADMINISTRATION

SYLLABUS

The development of local government.

The organisation, structure, functions and legal powers of local authorities, including other similar statutory public undertakings.

The internal organisation of authorities, with particular reference to their functions, i.e. highways, planning, public health, water, sewerage, river control and building regulation.

The relations between local authorities, central government and other public undertakings.

General problems of administration, and management such as planning and programming control of expenditure, personnel, policy, co-ordination, allocation of functions between departments.

Relationships with contractors and consultants.

Contract procedures.

Relations with the public.

*
—
*

This syllabus has been amended slightly as a result of local government reorganisation, and the wording too has been tidied up, but the fourth paragraph, 'general problems etc.' remains unaltered (at Spring 1976).

Appendix 4. Recommended reading

4.1 'Brief Bibliography' from IME Journal, Volume 96, June 1969, Page 163 (60)

- (a) 'An approach to the training and development of Managers'
Central Training Council, October 1961, HMSO 1s.6d.
- (b) 'Training and development of Managers. Further proposals'
Central Training Council, January 1969, HMSO 6s. 0d.
- (c) 'The diploma in management studies 1961-68. A progress
report by the Committee for the Diploma Scheme in England,
Wales and Northern Ireland'
Department of Education and Science. HMSO, October 1968.
- (d) 'Identifying supervisory training needs'
Department of Employment and Productivity, 1968,
HMSO 3s. 0d.
- (e) 'Supervisory Studies'
National Examinations Board, Supervisory Studies,
76 Portland Place, London W1.
2nd Edition, May 1969. 4s. 0d.

4.2 A list of '... introductory books of a general nature on Management' suggested by A. L. Minkes, Director of the Graduate Centre for Management Studies at Birmingham/Aston Universities, from IME Journal, Volume 96, July 1969, Page 191/2. (61)

Economics

- (a) 'The Price System' Dorfman
- (b) 'Economics' Samuelson
- (c) 'Economic Theory and Operations Analyses' 2nd Edition
W. J. Baumol.

Statistics

- (d) 'Facts from Figures' Moroney

Behavioural Sciences and General Works

- (e) 'The shape of automation' Simon
- (f) 'Corporate Strategy' Ansoff

4.3 Reviews of books listed in paragraph 4.2 above

A brief summary of each of these books follows:

(i) Robert Dorfman 'The Price System' 1964

This is one of a series of nine books called 'The Foundations of Modern Economics'. It is said that economics has grown so rapidly in recent years that no one book can now deal with the subject authoritatively.

The price system is defined as '... a system of economic organisation in which each individual, including ... corporations, decides for himself what contribution he will make to the economy with the understanding that he can sell that contribution at a price acceptable to him and the buyer, and that he can obtain the goods and services contributed by other individuals only at prices acceptable to them'. It goes on to deal with consumption, markets and prices. It is an interesting introduction to this aspect of economics though perhaps somewhat detailed and technical for the non-economist reader, especially one in the public sector.

(ii) Professor Paul A. Samuelson 'Economics, an Introductory Analysis' 2nd Edition, 1951. McGraw-Hill

The preface states:

"This book is designed for a one-semester or two-semester course in introductory economics. It is intended for the intelligent citizen interested in a general education, and it tries to supply a theoretical understanding of the economic institutions and problems of American civilisation in the middle of the twentieth century.

"The book concentrates on the big, vital and interesting problems: on inflation and depression; on family income and national income; on wages, prices and profits; and most important of all, on the conditions that will lead to rapid economic progress and security, and to efficient use of all our resources."

Scanning this book shows that it deals with basic economics in a straightforward way which is easy to understand and helpful to any people employed in the public sector. However, much of the detail, e.g. in social security, labour laws, banking, federal taxation, deals with the

USA and that is not likely to be of interest to most municipal engineers.

- (iii) Professor William J. Baumol, 'Economic theory and operations analysis'
3rd Edition. Prentice-Hall.

The author states that his book is intended to offer

"... a systematic exposition of received microeconomic analysis,
and an intuitive grasp of the many recent developments in
mathematical economics"

This work seems to attempt to relate some aspects of OR (e.g. linear programming) to economics. It deals with both subjects in a manner which is unlikely to attract municipal engineers, nor indeed to help them.

- (iv) M. J. Moroney, 'Facts from Figures', 2nd Edition 1953

This well known book on statistics needs little introduction. It covers all aspects of statistics for the general reader (who should, however, watch carefully for misprints) and to some extent is a handbook for the specialist too. The case on analysis of variance is generally agreed to be of particular lucidity and value.

- (v) Herbert A. Simon 'The Shape of Automation', 1965

This very well known book considers some effects of the computer on management. In particular the chapters on the new science of management decision have been widely quoted elsewhere. It is in these chapters that he set down his analysis of 'programmed' and 'non-programmed' decision-making.

An interesting and useful book.

- (vi) M. Igor Ansoff, 'Corporate Strategy', 1965

The preface contains a useful definition of management:

"This book is concerned with management, the active process of determining and guiding the course of a firm toward its objectives."
(page vii)

"Management of a business firm is a very large complex of activities which consists of analysis, decisions, communication, leadership, motivation, measurement, and control. Of these, we

"single out the process of decision-making, since it is the cornerstone of successful management."

This book claims to provide a practical method for strategic decision making within a business firm (page ix).

It is very much orientated to the private sector, and so much so that most public sector readers would deem it irrelevant to their work. It has a somewhat dated air.

4.4 Conclusions on books listed in paragraph 4.2

Of these books suggested by Minkes, the writer suggests that only Moroney is relevant without reservation. Of the books on economics, Baumol and Dorfman are too detailed, and too much of Samuelson relates to the USA, though with selective reading it is a very good basic introduction to economics.

Ansoff is scarcely relevant to the public sector, and though Simon is, the only chapter that is really relevant directly to management for the municipal engineer is that on the new science of management decision. This is available in the form of readings.

4.5 List of books suggested to the writer at his request by the Institution on 30.7.1970

- (a) 'Nationalisation and Public Ownership',* by W. A. Robson.
- (b) 'The Government Explains' by Marjorie Ogilvie-Webb.
- (c) 'Local Government in Leeds',* by H. Victor Wiseman.
- (d) 'Voters, Parties and Leaders' by J. Blondel.
- (e) 'Parliament and Public Ownership' by A. H. Hanson.
- (f) 'The lessons of public enterprise' by Michael Shanks.

A summary of each of these books follows:

* Titles incorrectly given - correct titles are shown overpage.

- (i) William A. Robson (Professor) 'Nationalised Industry and Public Ownership' 2nd Edition, 1966

As one would expect from such a knowledgeable man and successful author, this is a scholarly and interesting book.

It covers all aspects of public ownership.

He considers that the best candidates for nationalisation are new or expanding industries and the least probable are old, declining or stagnant branches of the economy.

There is an interesting section on 'principles of organisation' but these appear to relate entirely to nationalised industry and not to be of general application.

- (ii) Marjorie Ogilvie-Webb 'The Government Explains' RIPA, 1965

This is the result of a research project set up by the RIPA and sets out to explain the ways in which government disseminates information. The first chapter, which is a survey of the means available to government for disseminating information is interesting to the interested lay reader. It really has nothing to do with local government management, especially engineers.

Public relations may be something which managers should know about but this book is not a general treatise on Public Relations. It is about government information. It had set out to deal with local government too but gave it up.

- (iii) H. Victor Wiseman 'Local Government at Work', 1967

This is an introductory book and discusses the work of councillors in committee and in council. It illustrates their work by quoting from verbatim reports of debates. It briefly describes the annual estimates procedure from the members' point of view and discusses the majority party's group in action.

It is essentially a member's point of view and that perhaps is its major point of interest since the rest of the information given about meetings of committees and council would be quickly observed by a trainee engineer attending a few meetings.

- (iv) J. Blondel, 'Voters, Parties and Leaders', The Social Fabric of British Politics. Penguin Books, 1970 (revised 1974).

This book deals with politics, not administration nor management. It deals with class structure, occupations, incomes, education, and their relationship to social class.

It discusses electors, why they may vote in the way they do, or indeed abstain, but related to general elections, not local ones. The political parties are discussed and the membership considered. Members of Parliament are analysed.

Interest groups are discussed.

"The bureaucracy", i.e. the civil service, is discussed very narrowly and not in the management sense.

- (v) A. H. Hanson 'Parliament and Public Ownership', 1961.

The author states in a preface that this book is solely concerned with parliamentary control over the nationalised industries. The industries concerned are restricted and attention is concentrated on the National Coal Board, the British Transport Commission, the Electricity Boards, the Gas Boards and the Civil Airways Corporations.

The opening chapter discusses the various meanings of the word "bureaucracy".

Apart from this somewhat limited use (since other books now cover the matter more fully) the book is likely to be of little interest to local government officers.

(vi) Michael Shanks 'The Lessons of Public Enterprise', 1963

The preface states that the book's aim

"... is ... one of analysing - as dispassionately, honestly and objectively as we can - the progress of the nationalised industries in Britain to date, of trying to find out where, how and why performance has fallen below promise, and what must be done to enable performance to improve in the future."

It concludes by listing six arguments for public ownership:

- (a) the state should control the commanding heights of the economy.
- (b) planning is facilitated by public ownership.
- (c) the serious distortion in the allocation of resources between the public and private sectors would be correlated.
- (d) produces greater equality.
- (e) likely to be more efficient.
- (f) when the government provides money to industry, it has the right to see that it is properly used.

4.6 Conclusions on books listed in paragraph 4.5

Three of these books are on the nationalised industries, those by Robson, Hanson and Shanks. This is a subject of limited interest to the local government engineer though it is desirable that he has some knowledge of this subject, and Shanks is perhaps the most useful. Miss Ogilvie-Webb's book seems to be irrelevant to the subject of management for the municipal engineer. Wiseman's book is essentially directed at elected members (and potential members) and not really of much interest to engineers studying for this examination, though of interest to more senior officers.

Blondel's book is about politics and, though interesting, would take up students' valuable time.

Though many new books that are more relevant to the subject of management for the municipal engineer were published after 30 July 1970, this list of authors was republished, unrevised, in 1974. Thus, a more

relevant, more comprehensive and up-to-date list is needed.

4.7 List of publications recommended by the writer for the graduate engineer studying for the IME Part III examination in management

In view of the conclusion set out in 4.6, the following list of publications is suggested for the graduate engineer studying for the IME Part III examination in management and public administration. The list is deliberately brief.

(i) Essential

Brown, R.G.S. The Administrative Process in Britain, Methuen.

Fayol, Henri, General and Industrial Management, Pitman.

Koontz, Harold and O'Donnell, Cyril, Principles of Management, McGraw-Hill.

Leavitt, Harold J., Managerial Psychology, The University of Chicago Press.

Municipal Engineering, Management Data Sheets.

Simon, Herbert A., Administrative Behaviour, 2nd Edition, The Free Press.

(ii) Desirable

BIM Management Checklists.

BIM Information Sheets.

Civil Service Department Management Services in Government (quarterly).

Dearlove, John, The Politics of Policy in Local Government, Cambridge University Press.

Dempsey, Peter J.R., Psychology and the manager, Pan Management Series, 1973.

Dunsire, Andrew, Administration, the Word and the Science, Martin Robertson.

Glendinning, J.W. and Bullock, R.E.H., Management by Objectives in Local Government, Charles Knight.

Huneryager, S.G. and Heckmann, I.L., Human Relations in Management, South-western Publishing Company.

ICE, Civil engineering procedure, ICE, 1976.

Lupton, Tom, Management and the Social Sciences, Penguin Modern Management.

Ministry of Public Building and Works, Network Analysis in Construction Design, R & D Building Management Handbook 3, HMSO.

Metcalf, Henry C. and Urwick L, editors, Dynamic administration, the Collected Papers of Mary Parker Follett, Pitman.

Moroney M.J., Facts from Figures, Penguin Books.

Newton, Trevor, Cost Benefit Analysis in Administration, George Allen & Unwin.

Pen J., Modern Economics, Penguin Books.

Pollard, Harold R., Developments in Management Thought, Heinemann.

Pugh, D.S., Editor, Organisation Theory, Penguin modern management readings.

McGregor, Douglas, The Human Side of Enterprise, McGraw-Hill.

Royal Institute of Public Administration, Public Administration (quarterly).

Self, Peter, Administrative Theories and Politics, George Allen and Unwin.

Stewart J.D., Management in Local Government; a Viewpoint, Charles Knight.

Stewart, Rosemary, The Reality of Management, Pan Books.

Treasury H.M., The Practice of O & M, HMSO.

Vickers, Sir Geoffrey, The Art of Judgment, Chapman & Hall.

Appendix 5. Books

5.1 IME Library - classification

The following printed notice appeared in the library (28.9.72):--

"The books in the library have been arranged under the Universal Decimal Classification System. The main subjects with their reference numbers, written in white ink at the foot of the spine of each book, are as follows:-

34	Law
35	Public administration. Administrative Law.
51	Mathematics and Natural Sciences
52	Surveying, Geodesy
53	Physics and Mechanics
55	Geology and Collateral Sciences
62	Engineering and Technology generally
621.01	Mechanical Engineering, Theory and Principles
621.22	Water Power. Utilisation of Hydraulic Energy
621.31	Electrical Engineering
624	Civil, structural engineering
624.1	Earthwork, Foundations, Superstructures ¹ , Tunnelling
624.131	Soil Mechanics
624.15	Foundations
624.21	Bridges, bridge construction generally
625.7	Highway, Road Engineering
626	Hydraulic Engineering and Construction Work
627	Natural Water ² and Channels. River, Port, Harbour and Coast Works: Dams, etc.
628	Public Health Engineering
69	Building Industry, Materials, Trades, Construction
71	Physical Planning, Landscape, etc.
72	Architecture."

¹Sic should read substructures ² Sic should read Waters

Conclusion

In view of the vast amount of published material, especially (in the context of this survey) of management and public administration material, there would seem to be a case for links to be established between the libraries of the constituent members of the Council of Engineering Institutions (CEI), the Civil Service Central Management Library (63), the Royal Institute of Public Administration (RIPA) and the British Institute of Management (BIM), to facilitate the dissemination of books and papers to corporate members of the organisations involved.

5.2 Books on municipal engineering illustrating their content of management knowledge

- (i) Municipal Engineer and Surveyor's department by E. J. Elford (64) was published in 1928. It is useful on general routine matters and office administration such as the preparation of reports, estimates, and obtaining tenders. It includes many sample forms. It does not include anything on human relations, work study, principles of management, or theory of organisations.
- (ii) Municipal Engineering Law and Administration by J.B. Wikeley (62) was published in 1964. It incorporates a revision of Municipal Engineering Administration and Organisation which was written by R. S. Offord.

Wikeley's book describes the work of a municipal engineer's department and the way in which it is organised in sections. It covers what is traditionally known in such departments as 'administration' but does not deal with the subject of management.
- (iii) Management in civil engineering by Parsons, O'Herlihy and Rowe (65) was published in 1965. Part II is the one which deals with municipal engineering, and it was written by the Borough engineer and surveyor of Tynemouth. It is almost entirely descriptive of the duties and shape of the department, and does not deal with management theory or process.
- (iv) Municipal engineering practice by I.H. Seeley (66) was published in 1967. It includes a chapter on administration which is very brief.
- (v) Manual of British Water engineering practice, Vol 1, Organisation and management, 4th edition, 1969, editor W. O. Skeat (67), published for the Institution of Water Engineers by W. Heffer and Sons Ltd. Preface:

"... the manual should not be regarded as a text-book, but rather as an authoritative survey of sound water engineering practice, by reference to which the reader can obtain the fundamental outline of each of the subjects dealt with, whilst the bibliographies contain references to books more limited in scope but greater in detail."

'Organisation' in the sub-title refers to matters such as the national water Council, the white paper for reorganisation, resources, and Institutions and Associations, i.e. the organisation of the water supply industry and not 'organisation' in the management sense. Dealing with management, it says,

"The purpose of this manual is to provide a reference book for those engaged, directly or indirectly, in the water industry. This is not the place for airing esoteric theories about management and management techniques, as these can be in text books."

It begins with an organisation chart, then discusses the position of the chief officer. It discusses the various sections in a typical department, e.g. administration, accounts, distribution, and compares these in a company. There is a part dealing with public relations.

The bibliography to the chapter lists 26 references, all of which are Acts, circulars, statutory instruments, command papers, or committee reports.

There are chapters on economics, law and finance. All these matters are relevant to the organisation and management of water supply, but the book omits to deal with more general management matters such as recruitment, delegation, decision-making, human relations (except in construction where it gets a brief mention), principles of management and theories of organisation.

(vi) Civil engineering procedure, ICE

This booklet, now in its 3rd edition, is mainly concerned with contracts. There is, however, a paragraph on management literature in it, and a list of books on management.

Conclusion

The approach to management in municipal engineering shown by the authors of these five books is typical of the articles the writer has

identified as being on management and administration in the IME Journal.

However, this narrow approach is by no means confined to municipal engineers. Professor Peter Self in 'Administrative theories and politics', 1972 (68), states: (page 12)

"In Europe much writing and talking about the subject (i.e. public administration) was and still is done by senior administrators themselves, who have tended to concentrate upon formal descriptions and justifications of existing machinery."

Appendix 6. Financial Incentive Schemes

6.1 Introduction

There are 21 articles in the IME Journals which refer to incentive bonus schemes, commencing with Volume LX (1933-34) and ending with Volume 95 (1968). In general they point out that increased productivity can be obtained with the use of incentive bonus schemes based on work study. Some mention the difficulties of implementation and of securing quality of work, and of maintenance of the scheme.

None questions the effectiveness of finance-based incentive schemes.

The general local government atmosphere surrounding incentive bonus schemes is demonstrated by the following documents:

- a) National Board for Prices and Incomes Report No. 29, The pay and conditions of Manual Workers in Local Authorities, the National Health Service, Gas and Water supply. March 1967, Cmnd 3230 (69).
- b) Circular NM 190, 21 October 1968, of the National joint council for local authorities' services (Manual Workers) (70).

The following extracts concentrate on expected substantial gains in productivity and nowhere are possible doubtful effects mentioned. It is made clear, of course, that schemes must be 'properly constructed'.

6.2 PIB Report No. 29

Paragraph 57 states:

"Our enquiries suggest that there is extensive under-utilisation of labour in local authorities. The efficiency with which manpower is used varies, particularly with the size and type of authority, but the scope for significant improvement is widespread. There is an increasing awareness by some local authorities of the need for improvement and, in a few, large increases in labour productivity have already been achieved."

Paragraph 58 states:

"The scope for improvement is illustrated by the gains in labour utilisation that have already been achieved in individual cases."

Figures are then quoted in the Report showing increases in output per head.

For example, in highways work it ranges from 45 to 100 per cent; in refuse collection from 29 to 50 per cent; and in parks and cemeteries from 46 to 70 per cent.

Paragraph 60 states:

"The savings that can be achieved, however, from properly thought out schemes can be very great."

Paragraph 164 states:

"In the longer term, therefore, the solution to the problem of low pay must lie in the more effective use of labour through the introduction of properly constructed and controlled schemes of payment relating earnings to performance."

6.3 NJC Circular N.M.190

Paragraph 1 refers to PIB Report No. 29 (69) quoted above and particularly to the question of introducing schemes to relate earnings to performance as a means of combating the problem of low pay. Paragraph 2 states that the National joint council calls on each authority to examine ways and means of improving productivity as a matter of priority, and to introduce measures for relating pay to improved productivity. The measures were described as

- a) incentive bonus schemes based on work study,
- b) a short-term productivity increment.

In paragraph 10 authorities were urged to produce a plan and timetable for the introduction of incentive schemes.

6.4 The questioning of the effectiveness of financial incentive schemes

- (i) Melville Dalton, 'The industrial "rate-buster"; a characterisation' from Applied Anthropology, winter 1948; included in Payment Systems, Penguin modern management readings, Editor Tom Lupton, 1972 (71).

Dalton states that 70 per cent to 80 per cent of the whole group of machine operators were middle performers, who were torn incessantly with indecision and mental conflict over their performances. The remainder

of the group were either 'restricters' or 'rate-busters', i.e. those to whom a high rate of output, and high wage, were all that mattered. The restricters felt that the incentive scheme destroyed friendships and made the group a pawn of management.

- (ii) Donald Roy, 'Quota restrictions and goldbricking in a machine shop', from American Journal of Sociology, 1952 (72). Roy observed considerable restriction on output by machine shop operatives and concluded that the waste was great. He estimated that efficiency may be 75 per cent due to operatives simply wasting two hours each day.

"Confining scrutiny to the behaviour of machine operatives, the observer sees output restriction of such magnitude that the "phenomenal" results of the organisational innovations tried in the steel industry under the guiding genius of Joe Scanlon do not seem at all surprising."

- (iii) William Foote Whyte, 'Economic incentives and human relations', Harvard Business Review, Vol. 30, No. 2, 1952 (73):

"Systems of financial incentives in industry today probably yield a net gain in productivity, but most of them fail to release more than a small fraction of the energy and intelligence workers have to give to their jobs. Even when the financial incentive yields higher productivity, it may also generate such conflicts within the organisation that we must wonder whether the gains are worth the costs."

"Management should recognise that financial incentives are both a technical engineering and a human relations problem. The two aspects are so intimately intertwined that it is impossible to separate them in action."

"When an incentive scheme works badly, management explanations are usually a combination of half-truths and folklore. Even when a system works well, the explanations are likely to be so misleading as to make it impossible to generalise from one case to the next."

- (iv) It is very unlikely that many municipal engineers would have had access in 1948 and 1952 to the journals quoted from. However, a series of booklets published by HMSO for DSIR called 'Problems of progress in industry' would have been more accessible though having the word 'industry' in the title would deter many local government officers.

One booklet in the series (No.11) was Money for Effort (7) by Tom

Lupton, published in 1961.

He pointed out that a recent survey had shown only 33 per cent of British workers to be receiving some kind of financial incentive. He said it was possible that financial incentive schemes had not produced the expected results and that managers had therefore been discouraged. He also thought that where such schemes had been ineffective a possible explanation may be that they had been introduced "... in the main belief in a simple cash theory of motivation..." He concluded inter alia that

"The question whether or not they (financial incentive schemes) are likely to be effective, or why they have or have not been effective, cannot be answered by reference to crude theories or beliefs about human motivation, nor can their success be automatically assured by the concurrent application of "good" personnel policies. All these things have to be assessed within a much wider framework."

6.5 Conclusion

Questioning of the effectiveness of financial incentive bonus schemes began at least as early as 1948 in the USA, and in the UK in 1961. It would seem that either doubts about the use of such schemes were not well enough known, or were not taken into account. In view of the widespread lack of management knowledge in the UK (vide Appendix 7, para 7.8), it may well have been the former.

Appendix 7. Recent reports which endorse the value of management training, and demonstrate the awakening interest in the subject in local government

7.1 The Potts Report

The Potts report Action on the Banwell Report, HMSO 1967 (74) recommended the National Joint Consultative committee of architects, quantity surveyors and builders (NJCC) to consider establishing a management college for the whole of the industry.

7.2 PIB Report No. 29

National Board for Prices and Incomes Report No. 29, The Pay and conditions of manual workers in local authorities, the national health service, gas and water supply, Cmd 3230, HMSO, 1967 (69) said:

"64. Chief officers are usually chosen for their professional and technical competence and their ability to operate within the committee system of local government. Skill in the management of a large labour force does not rank as highly as technical expertise. The overriding emphasis given to professional qualities rather than to basic managerial skill presents serious problems, independently of those which arise from the absence of effective cost control mechanisms. Chief officers tend to be more remote from their employees than their counterparts in private industry, and the control of labour is frequently delegated to deputies or middle level officers.

"65. Such delegation, in itself, need not be a serious disadvantage: where the quality of middle management and the efficiency yardsticks and controls are satisfactory, few problems need arise. These conditions are seldom met: insufficient attention is given to equipping the officials concerned with the necessary managerial expertise and to encourage cost consciousness. Although there is an interest in the training of engineers in engineering, there is a lack of awareness of the need for formal training in management. Outside the County Councils few training schemes exist. Knowledge of modern management techniques is generally absent in small authorities and is limited even in large authorities; supervisors seldom receive any training in foremanship. The employment of management service units to remedy these defects is spreading, but too slowly to have produced a significant impact on the whole field.

"66. Managerial deficiencies at higher levels throw a weight of responsibility on the lower levels which they are generally unable to shoulder. Detailed planning of work on outdoor sites is often left to individual and inadequately trained gangers and, as a result, job planning is generally poor; overmanning of jobs and under-utilization of labour are the consequences." page 24.

7.3 PIB Report No. 45

National Board for Prices and Incomes, Report No.45, Pay of chief and senior officers in local government service and in the Greater London Council, Cmdd 3473, HMSO, 1967 (75) repeated statements made in Report No. 29 as follows:

"... principal officers are usually chosen for their professional and technical competence and... skill in management does not usually rank as highly as technical expertise." page 21.

7.4 The Mallaby Report

The Mallaby report, Staffing of local government, HMSO, 1967 (8), said: "Although management has long been systematically taught and studied in the USA it is only recently that appropriate teaching and university qualifications have existed in this country."

"In local government, as the professional officer gains experience and seniority he tends to become less concerned with the direct application of professional and technical skills and increasingly concerned with organisation and management. Principal officers, and in many cases their immediate subordinates have to exercise management responsibilities; they should therefore receive training in management at an appropriate stage in their careers." page 97.

N.B. about this time the course for senior officers (10 weeks) was begun at the Institute of Local government studies, Birmingham University, i.e. 1967.

7.5 The Marshall Report

Only three years after the PIB reports quoted above, the Marshall Report on highway maintenance was published in 1970 (9), and this said:

"Local authorities are slow to recognise that the effective running of a highway maintenance force requires substantial management skills in addition to expertise in civil engineering." page 57.

"There is as yet no tradition for managerial training. Very few management courses are run specifically for local authority employees and there was very little evidence of central coordination in the development of such courses until the introduction by the LGTB of the three week management courses." page 40.

"The training most needed and least available is that for middle management. This is an area where local authorities have lagged behind private industry, largely from a failure to recognise the need for management skills at higher levels in their maintenance

"organisations. The balance between the need for professional and managerial training should be assessed for each individual by analysing his job, but it seems that management is still not regarded as a serious field of study by more senior officers in local government."

"As highway maintenance work is carried out within the wider context of the local authority administrative organisation, the most senior officers concerned with highways should form part of the central management teams and be fully versed in the latest overall management techniques. Indeed we believe that it should be possible to promote to some management posts those without engineering qualifications if they have the relevant experience." page 45.

7.6 The Sharp Report

Messrs. Urwick, Orr and Partners Ltd. presented a final report dated 1.9.1969 entitled, Urban transportation manpower inquiry, to Lady Sharp. The report is printed as Annex D of Transport Planning: The men for the job (10), a report to the Minister of Transport by Lady Sharp, 1970.

The report of Messrs. Urwick, Orr and Partners Ltd. states in the opening paragraphs of their 'Conclusion' on page 116:

"We have been concerned, within the terms of reference and time allocated to this study, to produce a projection of the resources and capabilities that will be required for the transportation functions in local authorities of the future, and we presented our conclusions in both qualitative and quantitative terms. The conclusion that there will be a need for technical and managerial skills which are, in the main, outside the existing knowledge and experience of local government has important implications for manpower plans for the transportation function."

7.7 The Bains Report

Two years later, in 1972, the Bains report, The new local authorities, management and structure (11), was published. It said:

"Most senior officers in local government have been appointed on the basis of their professional knowledge and ability and relatively little attention has been paid to management skills, which we suggest are at this level equally, if not more important." page 53.

7.8 British Management education

In 1970 Mildred Wheatcroft wrote a book which is a comprehensive survey of management education in the UK at that time, and is much more

informative than the title of her book, The revolution in British management education, Pitman (12), may suggest. She considers events that have led, mainly in the previous decade, to the expansion of management education in the UK, discusses both the public and the private sector, the objectives of management education, surveys the main types of courses available, discusses the content of management education, and reviews the early development of management education both outside and inside the UK.

She shows how the UK (page 142) starting very late compared with the USA, embarked on a new era of development in management education in the early 1960s. This trend appears likely to accelerate. She says (page 42) that the Department of Education and Science attempts to distinguish between business studies and management education, describing the former as teaching the skills required for operating the techniques of business administration, and the latter as covering the training of men and women for the middle and higher posts carrying supervisory and decision-taking responsibilities. The DES prefers the development of management study at post-graduate rather than undergraduate level, largely because of the criticism that 'management' cannot be taught to very young men and that students should have had some practical experience before embarking on formal study (page 44). She points out that (page 66) attempts are sometimes made to distinguish between 'education' and 'training', education being regarded as developing a man's mind, and training as preparing him to carry out a particular task; but these distinctions are extremely difficult to sustain, particularly at senior levels of employment. The universities have considered themselves (page 67) responsible for education and not for training, but this distinction too may be difficult to sustain.

She discusses the proposition that managers are born not made (page 68) and concludes that though some men may have intrinsic advantages, a very great deal has to be learned by all managers in today's complex world.

She says (page 69) that management skills include the capacity to integrate a number of complex, relevant factors on which decisions must be based, making the right decisions, and seeing that these are carried out. Then there are the skills of getting other managers to make their maximum contribution, the art of chairmanship, of handling and motivating others to work together as a team, and the art of developing and coaching other managers.

The academic method she states (page 70) of the essay, the written answer, and the examination, should train a student to select the central relevant information from a mass of detail. Academic training should also help the student to express thoughts clearly and accurately in writing, to think quantitatively, and be able to calculate quickly and accurately. But the academic method has its shortcomings which she also discusses (see also page 29). However, she points out that (page 3) the British universities were slow to concede that business or management studies were suitable subjects for university education, particularly at undergraduate level, although a few have offered degrees in commerce for many years. In developing business and management education, universities in the UK have been very far behind those in the USA where the first graduate business school was started in 1881; in the UK not until 1965.

It was at the end of the '50s, she says (page 94), and the beginning of the '60s that the real push developed towards management education at a much higher academic level - what her book describes as the 'management revolution' - really started.

She quotes the Mallaby report in support of the need for management training in local government (page 107), and states (page 18) that there is an increasing need for management, in the parish, the rural district, the borough, the county or central government, to become more expert in making use of such tools and techniques as are available.

She quotes the Fulton report (page 110) and inter alia states that one of its recommendations (page 111) amounts to an assertion that post-graduate study is now almost essential for those who are to reach higher administrative posts.

She points out that (page 113) the older professional institutions (including the engineering institutions) have made an important contribution to management. Their contribution she says (page 114) is largely a managerial activity.

She quotes from Alistair Mant's research (page 138), saying that the 'specialist/technocrat manager' may have to decide between proceeding within his specialism or going into management; he may need updating of his specialism if he decides to proceed on that path, or a broadening course if he is to enter the management field. (In the event this may be too naive; see Appendix 8 'specialists into managers'.)

She also quotes from work by Professor Kenneth Andrews (page 135) and states that some engineers and technicians had greatly improved their management skills following management courses. Professor Andrews concluded that post-experience university courses had valuable effects in changing behaviour, increasing effectiveness and improving management skills, but that there appears no way of measuring these results.

7.9 Teaching public administration

Early in 1974, Richard A. Chapman completed work on a piece of research and it was published by the joint university council for social and public administration under the title of Teaching public administration (13).

He reviews the way in which teaching public administration began, and how it had developed. He severely criticises successive governments for neglecting to support it, in spite of lavishly supporting the British

Institute of Management.

He reviews the present state of teaching PA and concludes inter alia that there has been a considerable expansion of teaching public administration in non-university institutions (page 53) and that much of it is of very questionable quality.

7.10 CEI views

The views of the Council of Engineering Institutions on the value of management training are set out in Statement No. 9, Guidelines on Education and training for management, 1971 (76). It states inter alia:

"The 1968 CEI/Mintech survey showed that about 63% of professional engineers were in administrative or managerial posts of some kind. Engineers will need specific management training at an early age."

Every engineer is to some extent a manager of resources. It defines three levels of manager: functional, general, and top.

"The purpose of management training is to help the engineer to perform his present duties better. It may be thought preferable to prepare him from the start for his ultimate level of responsibility, but there is no practical alternative to step by step preparation.."

Competence in management arises as much from attitude and personality as from training.

It suggests taking formal training in management (e.g. stage 1 of DMS) at graduate engineer level and before qualifying as a professional engineer.

7.11 Mid-career training for engineers

In 1974 a joint report, Mid-career training (15), by the Institution of Civil Engineers, the Institution of Municipal Engineers and the Institution of Structural Engineers, the management knowledge required in professional engineers working at different levels in various types of organisation, are identified.

In contrast to some previously published material referred to in this

thesis (Appendix 5, paragraph 5.2), this report displays an appreciation of the wide content of management knowledge.

7.12 Conclusions

- (i) These several publications demonstrate the, now recognised, need for management knowledge in local government, and also show that recognition is late in relation to the USA.
- (ii) So far as municipal engineers in particular are concerned, it seems that the one way to fulfil that need was not made explicit until 1974.
- (iii) There seems to be a need to bring together the teaching of management and of public administration and to re-examine the teaching of public administration in non-university institutions.

Appendix 8. Transformation of specialists into managers

8.1 Introduction

The problem of educating specialists, such as chartered engineers, in other relevant areas, such as management, is not confined to chartered engineers or to local government.

8.2 General

In Principles of Management, McGraw-Hill, 1968 (17), pp 55-56, Koontz and O'Donnell discuss the matter. The evidence suggests that specialists can become senior managers but it does not suggest that being a specialist assists in reaching high levels.

They suggest that the large amount of time spent in acquiring their technical knowledge may place specialists at a disadvantage in acquiring management skills, partly because specialists have ipso facto less time at their disposal, and because up to twenty years spent in their specialism may narrow their outlook.

"The specialist may either neglect to keep up in his own field or lose sight of the relation of his activities to those of the department or enterprise. What is more, in his capacity as an expert, he is given no opportunity to practice managing."

That latter sentence does not apply to civil engineering generally unless the authors mean managing at a high level. This is probably the case because later on they say:

"... most managers, particularly at lower levels in the typical organisation, have technical as well as managerial functions."

8.3 NASA Report

The problem is discussed in Transformation of scientists and engineers into managers by James A. Bayton and Richard L. Chapman, National aeronautics and space administration, 1972 (77). The authors conclude that every organisation faces the critical problem of how to make managers from people who are specialists. They say that much of the present training that is given is irrelevant to the problems. They say that the most

striking change needed is the shift in focus from task-centred skills to those needed to master the organisational system. They discovered that there are motivational patterns for specialists which are quite different from those of managers, and that unless a specialist develops or acquires a manager's motivations, he will not succeed in the transition from his specialism to the task of managing.

8.4 Conclusion

Transforming specialists into managers is not just a question of further training. Specialists have to choose between keeping up with the latest knowledge in their particular field, and that in management. In addition, there is the further problem that, unless specialists respond to the motivational patterns that make for successful management, they are unlikely to perform the transformation satisfactorily.

Note: The reader who has read Appendices 1 - 8 inclusive in preference to the summary in Chapter 1, should now proceed to Chapter 2, Vol. 1, page 34.

Appendix 9 Management, Art or Science

- 9.1 Extract from Industrial Dynamics by Jay W Forrester
The MIT Press

INTRODUCTION

Management and Management Science

Management of countries and industries has developed over the centuries as an empirical art. During the last half century a management science has begun to develop but is not yet an effective basis for dealing with top-management problems. Just as the merging of physical science and engineering in the last twenty-five years became the basis for the modern upsurge in technology, so will the development of a foundation structure of industrial and economic behavior provide a new dimension in management effectiveness in the next twenty-five years.

THE manager's task is far more difficult and challenging than the normal tasks of the mathematician, the physicist, or the engineer. In management, many more significant factors must be taken into account. The interrelationships of the factors are more complex. The systems are of greater scope. The nonlinear relationships that control the course of events are more significant. Change is more the essence of the manager's environment.

In the past the arts, the sciences, and the traditional professions have been placed on an intellectual pedestal with a status above the study and practice of management. The illusion that the study of management lacked intellectual challenge has arisen, not because the field of management is wanting in unexplored frontiers, but because the intellectual opportunities were not recognized and the problems lay beyond the reach of traditional analysis methods.

Our most challenging intellectual frontier of the next three decades probably lies in the dynamics of social organizations, ranging from growth of the small corporation to development of national economies. As organizations grow more complex, the need for skilled leadership

becomes greater. Labor turmoil, bankruptcy, inflation, economic collapse, political unrest, revolution, and war testify that we are not yet expert enough in the design and management of social systems.

I.1 Management as an Art

Management is in transition from an art, based only on experience, to a profession, based on an underlying structure of principles and science.

Any worthwhile human endeavor emerges first as an art. We succeed before we understand why. The practice of medicine or of engineering began as an empirical art representing only the exercise of judgment based on experience. The development of the underlying sciences was motivated by the need to understand better the foundation on which the art rested.

The relationship between the growth of an art and the underlying science is illustrated in Figure I-1. The art develops through empirical experience but in time ceases to grow because of the disorganized state of its knowledge. When the need and necessary foundations coin-

MANAGEMENT AND MANAGEMENT SCIENCE

cide, a science develops to explain, organize, and distill experience into a more compact and usable form. As the science grows, it provides a new basis for further extension of the art.

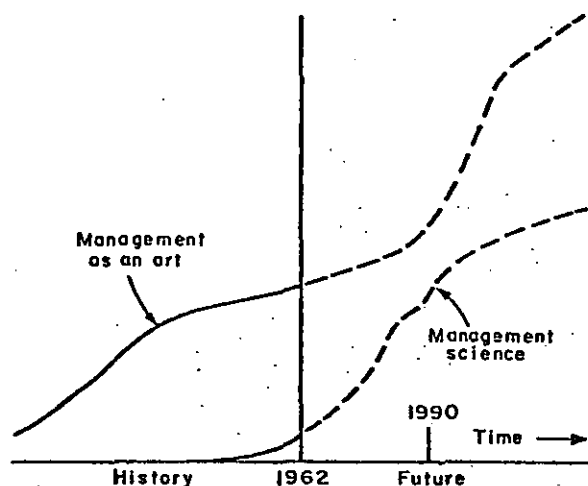


Figure I-1 Management art and science.

Over the centuries, management as an art has progressed by the acquisition and recording of human experience. But as long as there is no orderly underlying scientific base, the experiences remain as special cases. The lessons are poorly transferrable either in time or in space.

The corporate manager today finds little help in experiences recorded in the literature and carried forward from a generation ago. The descriptions are incomplete and lack precision. They arose from circumstances that cannot be properly related to today's events.

Likewise, contemporary management experiences are not so helpful as they could be to other managers. We still find each company and each industry believing its problems are unique. A discussion of present-day experiences in the context of another situation often elicits the rejoinder, "Yes, but my industry is different." Because of the lack of a suitable fundamental viewpoint, we fail to see how industrial experiences all deal with the same material, financial,

and human factors — all representing variations on the same underlying system.

Management education and practice have been highly fragmented. Manufacturing, finance, distribution, organization, advertising, and research have too often been viewed as separate skills and not as a part of a unified system. Too often management education consists of gathering current industrial practice and presenting it to the student as a sequence of unrelated subjects. Similarly, in his work in industry, the manager specializes within departments where his experience perpetuates the atmosphere of unrelated compartmentalization.

To unify the separate facets of management, selected experiences have been recorded as "cases" to provide a vehicle to discuss management as an interrelated system. This has been the best method available for integrating management knowledge, although it has been far from adequate.

From a discussion of management situations the student has been expected to gain intuitive insight into principles underlying the cases he studies, even though these principles of the industrial system are themselves not specifically formulated. Were engineering still to rest on the same descriptive transmittal of experience, we should not have today's advanced technology. The liberal-arts training through multiple exposure to recorded incidents of the past presumes that the student will distill an intuitive structure of human and social behavior around which to assemble and interpret his own experiences.

The rapid strides of professional progress come when the structure and principles that integrate individual experiences can be identified and taught explicitly rather than by indirection and diffusion. The student can then inherit an intellectual legacy from the past and build his own experiences upward from that level, rather than having to start over again at the point where his predecessors began.

Without an underlying science, advancement of an art eventually reaches a plateau. Manage-

ment has reached such a plateau. If progress is to continue, an applied science must arise as a foundation to support further development of the art. Such a base of applied science would permit experiences to be translated into a common frame of reference from which they could be transferred from the past to the present or from one location to another, to be effectively applied in new situations by other managers.

I.3 The Precedent of Engineering

The separation between management and management science is now closing. Management research is being realigned to coincide with the objectives of practicing managers. The trends that are shaping for the future appear to have a precedent in the recent history of engineering.

I.5 The Manager and Future Management Science

Managing is the task of *designing* and *controlling* an industrial system. Management science, if it is to be useful, must evolve effective methods to analyze the principal interactions among all the important components of a company and its external environment. It must be able to synthesize improved industrial systems.

Introduction

Towards a Science of Management

The growth of what we know today about management reflects a pattern found in other branches of human endeavour. First comes the art or craft stage, where skill is passed on from practitioner to apprentice. Then experience is collected, collated, and systematized with the aim of formalizing 'principles'. These may, in the course of time, form an integrated structure of thought, explaining phenomena encountered and offering reasonable predictions of the outcome of given acts or decisions.

Engineering has run through this progression during the last hundred years, if one takes the establishment of the first university degree course as a bench-mark. The social sciences are only now gaining comparable recognition. Management, which must rely to some extent on a synthesis of what engineering, mathematics, and the social sciences have to offer, is now straining to graft modern scientific thought on to the empiricism which has largely served it in the past.

F. W. Taylor (1) taught the elements of production management early in the twentieth century. Fayol (2) had already presented in 1918 an analysis of top management activities which holds good to this day. The ideas Mary Parker Follett (3) propounded in her lectures on human relationships between 1924 and her death in 1933 still make sense all these years later.

These classics, however, were not capable of being synthesized into anything like a comprehensive theoretical structure. New concepts were required, fundamental enough to deal with the many interactions of factors and influences which make up the dynamic character of industrial management. These only emerged when the mathematician Norbert Wiener published *Cybernetics* in 1948 (4). His exposition of 'feedback' as a principle of communication and control common to machines, animals,

Introduction

and human beings, provided a basis for a great deal of further development. Management activities previously treated descriptively for the most part, could now be viewed analytically in terms applicable to any form of management, irrespective of level, function or industry.

Wiener stressed the 'interdisciplinary approach' as the most rewarding and effort-saving means for pushing outwards more rapidly the frontiers of knowledge. It was paralleled by other interdisciplinary research into systems behaviour, typified by the work of the economist Kenneth Boulding (5) and the biologist L. von Bertalanffy (6). Their efforts to classify physical, biological, and social systems in order of their complexity have inspired a new field of research – general systems theory. Both cybernetics and systems research emphasize the dynamic nature of management. They see the organization, the activities which are to be co-ordinated and controlled, and the people within it as systems within the firm as a whole, which in turn forms one element of the economic, technical, and social system of a nation.

Dealing with complexes of elements which interact involves the use of concepts which are necessarily abstract: control, stability, growth, and choice figure amongst them. Used in a particular manner by one discipline, they prove relevant and useful in furthering understanding in others. Thus ideas drawn from such fields as engineering and biology can lead to a better comprehension of the management process.

Fears have been voiced that drawing on parallels from the physical sciences might foster a mechanistic approach to management situations. These would not seem to be justified. Medicine serves as an appropriate analogy to a science of managing. Little more than two hundred years ago those seeking to learn the art of healing became barber-surgeons' apprentices. Management is at the point of emerging from the barber-surgeon stage of medical science. In the same way as the doctor's touch became progressively more sure through improved diagnosis, derived from greater scientific insight into the complexities of the human body, so the management practitioner, concerned with organizational well-being, will be more effective in his work the better his understanding of the scientific aids at his disposal.

Introduction

To make the most of these scientific aids, a generally acceptable theoretical structure is needed which accords with and explains the management process as it is experienced in practice. That structure can only be built by formulating theories which are proved to be scientifically valid. Theories of this kind are essential if man is to strengthen the degree of control he now exercises over his environment. Hence their development must be encouraged, even though in the early stages they may fail to offer ready solutions to practical problems.

To revert to medical analogy, a physiology and pathology of management are needed. Significantly, a French biologist has studied the enterprise as 'a living cybernetic entity', (7) and another Frenchman has analysed the enterprise in the language of comparative physiology. (8)

Most of the original work on which we must draw has been produced in specialist fields and is widely scattered. The ideas are complex and often mathematical and can be simplified only to a limited extent. For those who would wish to dig more deeply, selected sources are given throughout.

Part I attempts to explain the basic lines of thought from which the notions of management science, based on systems analysis, are emerging. This is an exciting development even though progress made – insofar as it has a bearing on managerial problems and applications – may as yet be modest. Part II presents some of the more specific developments in what I have termed the technology of management seen from the standpoint of the analyst. Part III outlines the use of those management science techniques for which practitioners find progressively more use.

REFERENCES

1. Taylor, F. W. *Scientific Management*. Harper, 1911.
2. Fayol, H. *General and Industrial Management*. Pitman, 1949.
3. Follett, M. P. *Dynamic Administration*. Management Publications Trust, 1941.

10.1 First questionnaire

The first questionnaire (on green coloured paper) was issued with a letter (No. 1) dated 28 July 1973, to all chief technical officers in the East Midlands whose authorities were to remain in the four counties after reorganisation of local government.

A form asking for personal details of post-holders in the top three tiers was sent out with the questionnaire. Copies of these documents are reproduced on pages 215 to 217. In September 1973, a reminder (letter 2) was sent to chief officers who had not replied to the first letter of July 1973. A copy of this letter is reproduced on page 218. Some of the information which had been received was not as complete as was hoped, and so a supplementary questionnaire 1A was issued on pink coloured paper (with letter 3) to the chief officers concerned.

Data from the questionnaires are shown in Table 38, page 234. Employee ratios calculated from these data are shown in Table 39, page 237.

Town Hall
Ilkeston
Derbyshire
DE7 5RP.

28 July, 1973

Dear

Local Government Reorganisation

Surveyors' Departments, East Midlands

I am carrying out a survey of senior posts in Surveyors' departments of pre-reorganisation authorities in the East Midlands, under the auspices of the Loughborough University of Technology. The aim is to establish the various management patterns that are in use in the region.

I know very well that you receive numerous requests to give information but I hope you will feel that what I am asking is of more interest to you and your senior colleagues than some enquiries you receive.

I very much hope that you will assist me in this investigation which ought ultimately to be of benefit to senior officers in Surveyors' departments generally.

What I would like you to do is, 1) to complete the enclosed green form which relates to the top three tiers in your department, and 2) to ask each of your staff in the top three tiers to complete one of the white forms (including yourself).

You will see that I have kept the forms as simple as possible so as to cause you and your staff the least amount of trouble. If you feel that a simple diagram of your top structure would be helpful, I should be pleased to receive one.

I would be grateful if you would return all the completed forms in one batch, but if that is inconvenient, I should be pleased to receive individual forms.

All returns will be treated as Confidential.

Yours sincerely,

Borough Engineer and Surveyor

Surveyors' Departments; East MidlandsTown Hall,
Ilkeston,
Derbyshire DE7 5RP

July, 1973

Local Authority (before reorganisation):

Population:.....

Name of Holder of top-tier post:

(i.e. engineer & surveyor
or equivalent)

Name of Holder of second-tier post or posts:

(i.e. deputy or equivalent)

Name of Holders of third-tier posts:

(e.g. section heads)

Total number of employees (staff & workpeople)
for whom you are responsible:Which of the following functions
are you responsible for?

engineering (highways, sewerage, etc.)

architectural work

town planning

recreation

building control

Please
tick

.....

.....

.....

.....

.....

Please return this form when completed to A.S. Martin
Borough Engineer and Surveyor, at the above address.

Surveyors' Departments; East Midlands

Town Hall,
Ilkeston,
Derbyshire,
DE7 5RP.

July, 1973.

Dear Colleague,

This form is part of a survey of senior posts in Surveyors' departments in the East Midlands which I am carrying out under the auspices of the Loughborough University of Technology. It is proposed to examine the returns so as to establish the various management patterns used in the region.

I would very much appreciate your co-operation in ensuring the success of the investigation by completing this form and either handing it to your Surveyor or returning it direct to me.

Yours sincerely,

A. S. Martin

Borough Engineer and Surveyor

Name:

Local Authority:
(before reorganisation).....

Title of post held:

State degrees held (if any):

.....

State grade of membership of professional
Institutions (if any):

.....

.....

Age (tick appropriate line): Under 30

30 - 39

40 - 49

50 and over

Letter 2.

Town Hall,
Ilkeston,
Derbyshire.
DE7 5RP

September, 1973

Dear

Surveyors' Departments - East Midlands

In July I sent you a questionnaire on a green form together with several copies of a white form, to be completed by members of the top three tiers of your staff as part of a survey I am carrying out under the auspices of the Loughborough University of Technology.

I have received many completed forms (but not your own so far) and a preliminary analysis shows a remarkable consistency among departments having regard to the size of the authorities.

It would be most helpful if you would assist me to complete the picture for the East Midlands by filling in the forms and returning them to me.

I enclose a further copy of the green form and some white ones too. If you require any further forms I shall be pleased to supply them.

All returns will be treated as confidential.

Yours sincerely,

Borough Engineer and Surveyor

Letter 3.

Town Hall
Ilkeston
Derbyshire
DE7 5RP

September 1973

Dear

Surveyors' Departments - East Midlands

I am most grateful to you for returning the green and white forms I sent you in July and am sorry I have not been able to acknowledge their receipt before now.

The information you have given is very helpful, and you may be interested to know that a first analysis of the data shows a remarkable consistency between departments, bearing in mind the size of authorities.

I am seeking to refine the analysis and would very much appreciate your help in completing the enclosed pink form. It is a standard form dealing with all departments, and I have deleted the questions for which you have already supplied sufficient information.

I enclose a photo-copy of the green form which you sent back to me to assist you in filling in this second form, together with some white forms in case you need them.

I know you must be very busy indeed but I feel that the unexpectedly good results of the analysis make the risk of incurring your displeasure worthwhile!

Yours sincerely,

Borough Engineer and Surveyor.

Surveyors' Departments - East Midlands

Town Hall,
Ilkeston,
Derbyshire DE7 5R
September, 1973.

1. Local Authority (before reorganisation)
2. Number of staff posts (include vacancies) full time..... part time
3. Number of workpeople (include vacancies) full time part time
- 4.a) If clerical and administrative work is done by one of those named on the green form, what is his or her name?
- b) If it is done at 2nd or 3rd tier level by someone not named on the green form, what is his or her name?
- c) Please ask the person named in 4b to complete a white form and return it to me.
- 5.a) If building control work is done by one of those named on the green form, what is his name?
- b) If it is done at 2nd or 3rd tier level by someone not named on the green form, what is his name?
- c) Please ask the person named in 5b to complete a white form and return it to me.
- 6.a) Are there superintendents or foremen (e.g. highways, parks, refuse collection, etc.) who are responsible directly to 1st or 2nd tier officers other than those named on the green form? YES/NO
- b) If YES please state names
-
-
-
-
- c) Please ask the people named in 6b to complete white forms and return them to me.
7. Please ask the following people to complete a white form and return it to me
-
-
-
-
-
8.
-
-
-
-

10.2 Second questionnaire

After local government reorganisation had taken place, a second questionnaire, much longer than the first, was sent in 1974 (with letter 4) to the new chief technical officers of authorities in the East Midlands. Also sent out with the questionnaire was a form requesting personal information about people in the top three tiers. The letter, questionnaire, and form are reproduced on pages 222 - 229.

In March 1975 a reminder (letter 5) was sent out to 20 chief officers who had not replied, and this letter is reproduced on page 230.

Letter 4.

Telephone Long Eaton 4401
Extension 33

Town Hall
Long Eaton
Nottingham
NG10 1HU

November 1974

Dear

MANAGEMENT OF TECHNICAL SERVICES DEPARTMENTS

Now that the new authorities are settling in I should like to continue the survey of management structures in technical services departments (i.e. those departments which were formerly those of the Engineer & Surveyor) in the East Midlands.

This work is being done under the auspices of the University of Loughborough, and the results of the survey carried out before reorganisation are now being analysed. These results are encouraging and I hope that they will be completed in the next few months, and that they will be of use to us all.

I wish to compare the new departments with the old, and I hope you will help me with this second questionnaire.

Since I know you will be very busy I have divided the questionnaire into two: Part A and Part B. I think Part A can be completed without difficulty by your staff and I should like to have it back as soon as possible.

Part B is addressed to yourself and may take time to complete but I should like to have it back at your convenience. I also enclose a small sheet for each senior member of staff whose post is referred to in Question 5, which I should like to have completed as before.

Yours sincerely,

A. S. Martin
Director of Technical Services
Erewash Borough Council

CONFIDENTIAL

To be completed in all cases, and returned as soon as possible please.

Town Hall
Long Eaton
Nottingham
NG10 1HU

TECHNICAL SERVICES DEPARTMENTS, EAST MIDLANDS

- Department's Duties:

(a) Section 187 Roads
(L.G. Act 1972) claimed

- (b) Maintenance i.e. G.C. as of right;
Districts via agency or S.187.
Please state categories/classes
of roads

[illegible]

Carried Forward:

*Tick	Number Employed			
	Staff		Tradesmen & Manual	
	Full Time	Part Time	Full Time	Part Time

[illegible]

Brought Forward:

- (c) Improvements.
Please state value under District
agency

.....

.....

.....

- (d) Design. Please state value under District agency

.....

.....

.....

- (e) Traffic Management. . .
Please state extent under District
(District agency only) agency

.....

.....

.....

- (f) Other, if any.
Please state extent

[illegible]

Carried Forward:

*Tick where responsible for function shown.

*Tick	Number Employed			
	Staff		Tradesmen & Manual	
	Full Time	Part Time	Full Time	Part Time
Brought Forward:				
(ii) Sewerage				
(a) RWA standard agency				
(b) Other, if any. Please state extent				
.....				
.....				
(iii) Land drainage 				
(iv) Building Control 				
(v) Housing Maintenance 				
(vi) Refuse Collection 				
(vii) Refuse Disposal, please state extent of agency				
.....				
.....				
(viii) Architectural Work 				
(ix) Recreation 				
(x) Town Planning 				
(xi) Other, please specify				
.....				
.....				
.....				
.....				
.....				
.....				
TOTALS:				

- Deputy

Secretary

Administrative Officer

Others - please specify

.....

• • • • •

.....

.....

.....

.....

- Principal Assistant

Senior Assistant

Others - please specify

.....

.....

.....

.....

.....

.....

.....

• • • • •

.....

.....

- 226

Town Hall, Long Eaton, Nottingham, NG10 1HU

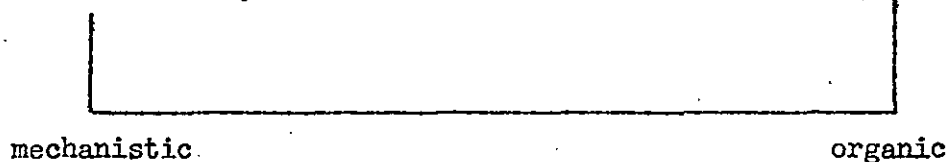
PART B - This part is addressed specifically to the Chief Officer.

NAME OF NEW LOCAL AUTHORITY

6 MANAGEMENT

Organisation

- (a) Have job descriptions been prepared for all posts?*
 none of the posts?*
 some of the posts?*
- (b) Has a uniform span of control been adopted throughout the organisation? Yes/No*
- (c) Are groups of officers being set up to achieve specified ends - e.g. programme groups for housing, recreation, etc. Yes/No*
- (d) Is delegation from Council to Committees written/assumed/other*
 " " " Council/Committees to officers written/assumed/other*
 " " " Chief Officer to his staff written/assumed/other*
- (e) Is the Burns-Stalker spectrum of organisational types helpful in categorising your type of organisation? Yes/No/not applicable*
- (f) If yes, please indicate in the diagram where in the Burns-Stalker spectrum of organisational types you consider that yours lies:



Techniques

- (g) Is any use being made, or proposed to be made, of techniques, e.g. PPBS, MbO? If so please specify.

.....

.....

.....

- (h) Have any management training courses been of particular use to you in your present post? If so please specify.

.....

.....

.....

- (i) Have you found any management literature of particular use in your present post? If so please specify:

.....
.....
.....

7 PAYROLL

Departmental salary bill (monthly)

Departmental wages bill (weekly)

Full Time	Part Time
£	£
£	£

- 8 Other general observations or comments on departmental organisation, or any other matter:

.....
.....
.....
.....
.....
.....

Town Hall
LONG EATON
Nottingham
NG10 1HU

TECHNICAL SERVICES DEPARTMENTS, EAST MIDLANDS

This form is part of a survey of senior posts in technical services departments (formerly Engineers & Surveyors' departments) in the East Midlands which I am carrying out under the auspices of the Loughborough University of Technology. It is proposed to examine the returns so as to establish the kinds of management patterns used in the region.

Yours sincerely,

Name

The local authority which I served up to 1 April 1974 is/is not* incorporated in this new authority.

Degrees held (if any)

.....

.....

.....

*Please delete as required

229

Letter 5.

A. S. Martin C Eng FIMunE
Director of Technical Services

Town Hall
Long Eaton
Nottingham
NG10 1HU

6 March 1975

Dear

MANAGEMENT OF TECHNICAL SERVICES DEPARTMENTS

You may recall that I wrote to you last November asking you to be kind enough to complete a questionnaire for me. I realise that it was not a very good time to be sending out such a questionnaire because we have all been extremely busy establishing new systems and getting our departments running. On top of all that of course there was the preparation of annual estimates.

Now that those are completed I hope that you may have a little more time and I would be most grateful if you could complete the questionnaire and return it to me. I am pleased to say that there has been a very good response to complete the questionnaire from our colleagues in the East Midlands and I would prefer not to miss out any of the new Authorities.

Yours sincerely,

Director.

10.3 Third questionnaire

In August 1975 an abbreviated questionnaire 3 was issued (with letter 6) to chief officers who had not replied to the previous requests for information. Copies of the letter and questionnaire are reproduced on pages 232 to 233.

Data from the questionnaires are shown in Table 40, page 240; and employee ratios calculated from these data are shown in Table 41, page 241.

Letter 6.

Town Hall
Long Eaton
Nottingham
NG10 1HU

August 1975

Dear

MANAGEMENT OF TECHNICAL SERVICES DEPARTMENTS

I am sorry that you have been unable so far to return the completed questionnaire which I sent to you last November, but I appreciate that setting up new organisations has been very burdensome.

However, I would be most grateful if you could let me have a small amount of information so that I can complete some analyses.

I really need to know the number of employees (both full-time and part-time) and the number of functions for which you are responsible, as shown on the attached sheet. All information supplied is treated as strictly confidential and is coded before it leaves my hands. I should be pleased to supply any results of my work which you may wish to have in confidence.

Your early return of this simplified questionnaire would be most appreciated.

Yours sincerely

Director

LOCAL AUTHORITY _____

Please delete the appropriate part of the YES/NO alternative to show the functions for which you are responsible:

<u>Highways</u>	Maintenance	YES/NO
	Improvements	YES/NO
	Design	YES/NO
	Traffic Management	YES/NO
<u>Sewerage</u>		YES/NO
<u>Land Drainage</u>		YES/NO
<u>Building Control</u>		YES/NO
<u>Housing Maintenance</u>		YES/NO
<u>Refuse Collection</u>		YES/NO
<u>Refuse Disposal</u>		YES/NO
<u>Architectural Work</u>		YES/NO
<u>Recreation</u>		YES/NO
<u>Town Planning</u>		YES/NO
<u>Others (please state)</u>		

.....

No. of
Employees

Staff

Manual/
 tradesmen

Totals

Full Time	Part Time

Full Time
 Equivalent

*Counting each part time employee as half

Please return to: Director of Technical Services
 Erewash Borough Council
 Town Hall
 LONG EATON
 Nottingham
 NG10 1HU

Code No.	Local Authority	Population	Top 3 Tiers(numbers)				Employees(numbers)		
			2nd	3rd	outside supers	Total	White	Blue	Total
1		665630	1	3	6	10	260	680	940
2		19880	1	4	5	10	23 $\frac{1}{2}$	93	116 $\frac{1}{2}$
3		24360	1	5	1	7	21	72 $\frac{1}{2}$	93 $\frac{1}{2}$
4		9140	1	3	2	6	7	27 $\frac{1}{2}$	34 $\frac{1}{2}$
5		5290	2	1	3	6	5	22	27
6		18700	1	2	1	4	10	26	36
7		69960	1	6	1	8	93	70	163
8		17670	1	3	1	5	17	31	48
9		69090	1	6	1	8	80	90	170
10		5610	1	2	2	5	10	32 $\frac{1}{2}$	42 $\frac{1}{2}$
11		4320	1	2	1	4	5	26	31
12		20180	1	4	2	7	9	79	88
13		5140	1	0	1	2	2	22 $\frac{1}{2}$	24 $\frac{1}{2}$
14		11860	1	2	1	4	5	7 $\frac{1}{2}$	12 $\frac{1}{2}$
15		18650	1	1	0	2	5	12	17
16		9720	1	2	1	4	8	70 $\frac{1}{2}$	78 $\frac{1}{2}$
17		18070	1	3	2	6	15	59	74
18		10940	1	2	3	6	11	42	53
19		42470	2	2	1	5	40 $\frac{1}{2}$	116	156 $\frac{1}{2}$
20		18920	2	2	1	5	9	37	46
21		21640	1	3	4	8	25	133	158
22		16500	1	4	3	8	10	56	66
23		24300	1	2	1	4	15	73	88
24		17880	1	4	3	8	15	57 $\frac{1}{2}$	72 $\frac{1}{2}$
25		24810	1	5	1		19	9 $\frac{1}{2}$	28 $\frac{1}{2}$
26		219320	1	2	4	7	277	680	957
27		34210	1	6	4	11	48 $\frac{1}{2}$	144 $\frac{1}{2}$	193
28		33630	1	4	6	11	45	122 $\frac{1}{2}$	167 $\frac{1}{2}$
29		40150	1	4	1	6	18	20	38
30		20240	1	2	3	6	15	75	90
31		32300	1	3	1	5	22	20	42
32		105600	1	3	3	7	60 $\frac{1}{2}$	211	271 $\frac{1}{2}$
33		160200	1	1	1	3	65	200	265
34		376810	1	2	1	4	252	614	866
35		17580	2	3	3	8	20	77	97
36		2540	0	0	0	0	1	6	7
37		14960	1	3	0	4	5	36	41
38		12600	1	2	0	3	8	15	23
39		23370	3	6	2	11	9	23	32
40		11710	1	3	0	4	14 $\frac{1}{2}$	55 $\frac{1}{2}$	70
41		2310	2	0	1	3	2	12 $\frac{1}{2}$	14 $\frac{1}{2}$
42		4100	1	1	1	3	4	25	29
43		6100	1	3	3	7	6	34	40
44		13270	1	4	3	8	20	110	130
45		2300	1	4	2	7	6 $\frac{1}{2}$	9 $\frac{1}{2}$	16
46		14670	1	5	2	8	10	28 $\frac{1}{2}$	38 $\frac{1}{2}$
47		18880	1	5	1	7	12	40	52
48		22340	1	3	1	5	13	49 $\frac{1}{2}$	62 $\frac{1}{2}$
49		74090	1	3	5	9	84 $\frac{1}{2}$	313 $\frac{1}{2}$	398
50		8140	1	2 $\frac{1}{2}$	1	4 $\frac{1}{2}$	3 $\frac{1}{2}$	32	35 $\frac{1}{2}$
51		21790	1	2	3	6	13	28	41
52		44730	2	6	3	11	30	75	105
53		26030	1	3	6	10	27	203	230
54		22790	1	3	2	6	15	88	103

TABLE 38. Data from pre-LGR authorities.

continued 0/page:

Code No.	Local Authority	Population	Top 3 Tiers (numbers)				Employees (numbers)		
			2nd	3rd	outside supers	Total	White	Blue	Total
55		27890	2	3	4	9	29	97½	126½
56		14310	1	2	4	7	12	77	89
57		6450	1	2		3	5	46	51
58		19400	1	4	2	7	19	48	67
59		16910	1				12	53	65
60		21070	2	4	0	6	9	0	9
61		18740	1	2	0	3	7½	0	7½
62		489900	1	3		4	180	490	670
63		8300	1	½	0	1½	2½	29½	32
64		3000	1	0	0	1	2	12½	14½
65		28360	1	4	5	10	27	120	147
66		14680	1	3	0	4	6	20	26
67		11850	2	2	1	5	5	30	35
68		32220	1	2	0	3	12	0	12
69		48180	1	4	2	7	57	175	232
70		8410	1	3	2	6	11	43	54
71		70850	1	2	0	3	29	106	135
72		19840	1	3	1	5	25	79½	104½
73		18890	1	5	0	6	13	30	43
74		48170	1	4	5	10	59	202½	261½
75		282000	1	2	0	3	333½	858	1191½
76		74220	1	4	2	7	37½	104	141½
77		19730	1	2	3	6	10	31½	41½
78		30140	1	3	4	8	24½	94½	119
79		14440	1	4	4	9	16	60	76
80		11200	1	3	2	6	11	19	30
81		15520	6	0	2	8	8	35	43
82		11850	4	2	1	7	6	15	21
83		29230	1	1	0	2	16	61	77
84		6810	1	1	3	5	6	25½	31½
85		3770	1	0	0	1	2	7½	9½
86		11900	1	1	2	4	5	19½	24½
87		6750	1	0	2	3	3	10	13
88		675380	1	4		5			537
89		18340	1	3	4	8	13	80	93
90		36110	1	4	1	6	51	169	220
91		23700	5	0	2	7	7	17	24
92		21190	1	3	2	6	12	61½	73½
93		57820	1	4	4	9	83	470	553
94		24810	1	3	1	5	8	67	75
95		12940	1	1	1	3	3	27	30
96		24540	1	3	8	12	23	130	153
97		16785	1	2	1	4	7	32	39
98		57270	1	3	2	6	10	18½	28½
99		28360	1	2	4	7	24	72	96
100		23590	1	4	4	9			
101		40240	4	6	6	6	62	357	219
102		71050	1	3	1	5	25	46½	71½
103		63630	1	4	1	6	67	259½	326½
104		10840	1	3	2	6	5	37	42
105		296750	1	5	1	7	302	733	1035
106		33130	1	5	1	7	18	88	106
107		44960	1			1	27	133	160
108		28420	1	2	2	5	18½	96	114½
109		39290	1	3	2	6	19½	28½	48

continued over page

TABLE 38 (continued) Data from pre-LGR authorities

TABLE 38. (continued)

Notes:

1. Part-time employees are counted as half full-time.
2. Superintendents are considered as reporting to 1st or 2nd tiers.
3. Clerks of works are considered to be outside supervisors unless engaged on building control work.

L.A. Code No.	Population	Type	No. of Func- tions	E m p l o y e e s			
				Total/ 1000 Pop.	Blue/ 1000 Pop.	White/ 1000 Pop.	Blue/ White
88	675,380	CC	1	0.80			
1	665,630	CC	1	1.41	1.02	0.39	2.62
62	489,900	CC	1	1.37	1	0.37	2.72
34	376,810	CC	1	2.30	1.63	0.67	2.44
105	296,750	CB	1	3.49	2.47	1.02	2.43
75	282,000	CB	2	4.23	3.04	1.18	2.57
26	219,320	CB	1	4.36	3.10	1.26	2.45
33	160,200	CC	1	1.65	1.25	0.41	3.08
32	105,600	CC	1	2.57	2.00	0.57	3.49
76	74,220	RD	2.5	1.91	1.40	0.51	2.77
49	74,090	CB	3	5.37	4.23	1.14	3.71
102	71,050	RD	5	1.01	0.65	0.35	1.86
71	70,850	RD	4	1.91	1.50	0.41	3.66
7	69,960	B	4	2.33	1.00	1.33	0.75
9	69,090	RD	5	2.46	1.30	1.16	1.13
103	63,630	UD	4	5.13	4.08	1.05	3.87
93	57,820	B	4	9.56	8.12	1.44	5.66
98	57,270	RD	1	0.50	0.32	0.18	1.85
69	48,180	B	4	4.82	3.63	1.18	3.07
74	48,170	UD	5	5.43	4.20	1.23	3.43
107	44,960	UD	5	3.56	2.96	0.60	4.93
52	44,730	RD	5	2.35	1.68	0.67	2.50
19	42,470	RD	3	3.68	2.73	0.95	2.86
101	40,240	UD	5	5.44	3.90	1.54	2.53
29	40,150	RD	5	0.95	0.50	0.45	1.11
109	39,290	RD	5	1.22	0.73	0.50	1.46
90	36,110	B	4.5	6.09	4.68	1.41	3.31
27	34,210	B	5	5.64	4.22	1.42	2.98
28	33,630	UD	4.5	4.98	3.64	1.34	2.72
106	33,130	UD	5	3.20	2.66	0.54	4.89
31	32,300	RD	5	1.30	0.62	0.68	0.90
68	32,200	RD	4	0.37	0	0.37	0
78	30,140	UD	5	3.95	3.14	0.81	3.86
83	29,230	CC	1	2.63	2.09	0.55	3.81
108	28,420	UD	5	4.03	3.38	0.65	5.19
65	28,360	UD	5	5.18	4.23	0.95	4.44
99	28,360	UD	4	3.39	2.54	0.85	3.00
55	27,890	B	5	4.54	3.50	1.04	3.36
53	26,030	B	5	8.84	7.80	1.04	7.52

TABLE 39. Employee ratios pre-IGR. 237

continued over page

L.A. Code No.	Population	Type	No. of Functions	E m p l o y e e s			
				Total/ 1000 Pop.	Blue/ 1000 Pop.	White/ 1000 Pop.	Blue/ White
25	24,810	RD	4	1.15	0.38	0.77	0.50
94	24,810	UD	4	3.02	2.70	0.32	8.38
96	24,540	B	5	6.24	5.30	0.94	5.65
3	24,360	B	4	3.84	2.98	0.86	3.45
23	24,300	UD	5	3.62	3.00	0.62	4.87
91	23,700	RD	4	1.01	0.72	0.30	2.43
100	23,590	UD					
39	23,370	RD	5	1.37	0.98	0.39	2.56
54	22,790	RD	5	4.52	3.86	0.66	5.87
48	22,340	RD	5	2.80	2.22	0.58	3.81
51	21,790	RD	5	1.88	1.28	0.60	2.15
21	21,640	UD	4	7.30	6.15	1.16	5.32
92	21,190	RD	4	3.47	2.90	0.57	5.13
60	21,070	RD	3	0.43	0	0.43	0
30	20,240	UD	5	4.45	3.71	0.74	5.00
12	20,180	UD	5	4.36	3.91	0.45	8.80
2	19,880	B	5	5.86	4.68	1.18	3.96
72	19,840	UD	5	5.27	4.01	1.26	3.18
77	19,730	UD	5	2.10	1.60	0.51	3.15
58	19,400	RD	5	3.45	2.47	0.98	2.53
20	18,920	RD	4	2.43	1.96	0.48	4.11
73	18,890	RD	3	2.28	1.59	0.69	2.31
47	18,880	RD	3	2.75	2.12	0.64	3.33
61	18,740	RD	3	0.40	0	0.40	0
6	18,700	RD	4	1.93	1.39	0.54	2.60
15	18,650	RD	4	0.90	0.64	0.27	2.40
89	18,340	B	3	5.07	4.36	0.71	6.15
17	18,070	UD	4	4.10	3.27	0.83	3.90
24	17,880	UD	4	4.05	3.22	0.84	3.83
8	17,670	UD	4	2.72	1.75	0.96	1.82
35	17,580	UD	5	5.52	4.38	1.14	3.85
59	16,910	UD	4	3.84	3.13	0.71	4.42
97	16,785	RD	4	2.32	1.91	0.42	4.57
22	16,500	UD	4	4.00	3.39	0.61	5.60
81	15,520	RD	5	2.77	2.26	0.52	4.38
37	14,960	RD	4	2.74	2.41	0.33	7.20
66	14,680	RD	2	1.77	1.36	0.41	3.33
46	14,670	RD	5	2.62	1.94	0.68	2.85

continued over page

TABLE 39. Employee ratios pre-LGR. (continued)

L.A. Code No.	Population	Type	No. of Func- tions	E m p l o y e e s			
				Total/ 1000 Pop.	Blue/ 1000 Pop.	White/ 1000 Pop.	Blue/ White
79	14,440	UD	5	5.26	4.16	1.11	3.75
56	14,310	B	4.5	6.22	5.38	0.84	6.42
44	13,270	UD	5	9.80	8.29	1.51	5.50
95	12,940	UD	5	2.32	2.09	0.23	9.08
38	12,600	RD	5	1.83	1.19	0.64	1.88
86	11,900	RD	3	2.06	1.64	0.42	3.90
14	11,860	RD	4	1.05	0.63	0.42	1.50
67	11,850	RD	3	2.95	2.53	0.42	6.00
82	11,850	RD	4	1.77	1.27	0.50	2.54
40	11,710	B	5	5.98	4.74	1.24	3.83
80	11,200	RD	4	2.69	1.70	0.98	1.73
18	10,940	UD	5	4.84	3.84	1.01	3.82
104	10,840	UD	4	3.87	3.41	0.46	7.40
16	9720	UD	5	8.08	7.25	0.82	9.80
4	9140	UD	4.5	3.77	3.01	0.77	3.93
70	8410	UD	4	6.42	5.11	1.31	3.90
63	8300	UD	4	3.86	3.55	0.30	11.80
50	8140	UD	5	4.36	3.93	0.43	9.14
84	6810	UD	4	4.63	3.74	0.88	4.25
87	6750	RD	1	1.93	1.48	0.44	3.33
57	6450	UD	5	7.91	7.13	0.78	9.20
43	6100	UD	5	6.56	5.57	0.98	5.67
10	5610	UD	5	7.58	5.79	1.78	3.25
5	5290	UD	5	5.10	4.15	0.95	4.40
13	5140	UD	5	4.77	4.38	0.39	11.25
11	4320	UD	5	7.18	6.02	1.16	5.20
42	4100	UD	-	7.07	6.10	0.96	6.25
85	3770	RD	3	2.52	1.99	0.53	3.75
64	3000	UD	4	4.83	4.17	0.67	6.25
36	2540	UD	5	2.76	2.36	0.39	6.00
41	2310	UD	5	6.30	5.41	0.86	6.25
45	2300	UD	4	6.96	4.13	2.83	1.46

TABLE 39. Employee ratios - pre-LGR (continued)

Note: The L.A. Code numbers are as shown in Table 38.

Code No.	Post-IGR Local Authorities	Employees				Equivalent Totals F/T		Equiv. Total F/T B + W	Population
		White		Blue		White	Blue		
		F/T	P/T	F/T	P/T				
FF		338	—	693	—	338	693	1031	888340
I		98	2	221	22	99	232	331	106130
S		37	0	83	0	37	83	120	70980
E		120	0	220	5	120	222½	342½	95470
B		175	4	313	34	177	330	507	217930
D		130	7	152	54	133½	179	312½	100040
Q		44	1	207	25	44½	219½	264	79570
O		62	8	96	39	66	115½	181½	90050
Z		21	13	99	15	27½	106½	134	61730
U		32	4	0	0	34	0	34	65990
GG		231	—	561	—	231	561	792	824360
DD		17	27	73	11	30½	78½	109	76510
HH									130900
BB		20	—	108	8	20	112	132	56160
J		92	—	163	15	92	170½	262½	78330
C		199	4	658	13	201	664½	865½	287350
X		26	1	67	—	26½	67	93½	40010
R		44	0	117	22	44	128	172	72620
AA		10	1	79	27	10½	92½	103	52350
		21	—	—	—	21	—	21	
EE		7	7	16	3	10½	17½	28	30130
II		206	—	805	—	206	805	1011	512880
W		29	0	113	20	29	123	152	49270
K		69	2	—	—	70	—	70	98220
M		67	2	258	59	68	287½	355½	73260
T		36	0	55	6	36	58	94	74890
Y		24	10	48	36	29	66	95	57100
L		67	7	248	61	70½	278½	349	87860
F		120	10	123	1	125	123½	248½	72280
JJ		164	4	300	—	166	300	466	982460
H		113	5	415	127	115½	478½	594	102530
KK		111	0	207	0	111	207	318	99630
N		63	0	276	4	63	278	341	100800
LL									99720
G		114	14	683	53	121	709½	830½	96730
CC		18	—	81	22	18	92	110	100750
A		495	2	848	15	496	855½	1351½	294700
P		48	0	187	38	48	206	254	87600
V		28	2	23	6	29	26	53	82360
MM		96	0	0	0	96	0	96	110000

Notes: 1. Part-time employees are counted as half full-time.
2. The source of the population figures is Local Government in England and Wales, A Guide to the New System, Department of the Environment.

TABLE 40. Data from post-IGR authorities

L.A. Code. No.	Pop (1000s)	Employees			
		Total/Pop	Blue/Pop	White/Pop	Blue/White
I	106.13	3.01	2.08	0.92	2.26
S	70.98	1.69	1.17	0.52	2.24
E	95.47	3.56	2.30	1.26	1.83
B	217.93	2.24	1.44	0.80	1.79
D	100.04	2.82	1.52	1.30	1.17
Q	79.57	3.15	2.60	0.55	4.71
O	90.05	1.76	1.07	0.69	1.55
Z	61.73	1.94	1.60	0.34	4.71
U	65.97	0.49	0	0.49	0
DD	76.51	1.18	0.95	0.22	4.29
BB	56.16	2.28	1.92	0.36	5.40
J	78.33	3.26	2.08	1.17	1.77
C	287.35	2.98	2.29	0.69	3.31
X	40.01	2.32	1.67	0.65	2.58
R	72.62	2.22	1.61	0.61	2.66
AA	52.35	2.10	1.51	0.59	2.55
EE	30.13	0.76	0.53	0.23	2.29
W	49.27	2.86	2.29	0.59	3.86
K	98.22	0.70	0	0.70	0
M	73.26	4.44	3.52	0.92	3.85
T	74.89	1.22	0.73	0.48	1.53
Y	57.10	1.26	0.84	0.42	2.00
L	87.86	3.59	2.82	0.76	3.70
F	72.28	3.36	1.70	1.66	1.03
H	102.53	5.15	4.05	1.10	3.67
KK	99.63	3.19	2.08	1.11	1.87
N	100.80	3.36	2.74	0.63	4.38
G	96.73	8.24	7.06	1.18	5.99
CC	100.75	0.98	0.80	0.18	4.50
A	294.70	4.56	2.88	1.68	1.71
P	87.60	2.68	2.14	0.55	3.90

2 depts
combined

TABLE 41. Post-LGR District Authorities - Full-time employee ratios.

ALGES Association of Local Government
Engineers and Surveyors
P.O. Box No. 628,
LONDON SW19 7PF.

February, 1974.

Dear Sir,

Salary Statistics - District Councils

The Association is compiling information on the salaries of technical officers in the new Authorities, so that they may advise members on salary levels and it would be most helpful if you would complete the short questionnaire below and return to me as soon as possible.

I realise that you are under great pressure and that complying with requests such as mine can be irritating, but I do assure you that the information is vital in dealing with problems of professional engineers at all levels and your assistance will be much appreciated. I enclose an additional copy for your files and if you would like a copy of the summary of replies received (which will not identify individual authorities), please indicate accordingly.

Yours faithfully,

T. G. GREENING.

Hon. Secretary.

Please give information as at 1.4.1974

Authority: _____ District Council.

Population: _____ Area: _____ acres/hectares

Chief Technical Officer post <u>includes</u> :	Planning	Yes/No
	Architecture	Yes/No
	Engineering	Yes/No
	Building Control	Yes/No
	Building Maintenance	Yes/No
	Parks, etc.	Yes/No
	Refuse Collection, etc.	Yes/No

Other major responsibilities (please specify)

Salary scale of (a) Chief Technical Officer £ _____ to £ _____

(b) Second tier post(s) £ _____ to £ _____

(c) Third tier post(s) £ _____ to £ _____

Would you please state proper designations of posts:

(a) _____

(b) _____

(c) _____

I should/should not like a copy of the return.

Signed: _____ Date: _____

Appendix 12. An example of the prevailing attitude of Managers
in Municipal engineering

12.1 Correspondence

Mr. D.E. Lawrance, Upper Severn Divisional Manager of the Severn-Trent Water Authority, presented a paper to the Annual Conference of the Institution of Municipal Engineers, 1976, entitled "Running water - divisional reflections" (78). One section of the paper was headed 'organisation' and this is reproduced in paragraph 12.2. After the conference, the writer in private correspondence (17 June 1976) with Mr. Lawrance said, "You refer to the fact that positive steps were taken during the production and refinement of organisation structures to overcome the problem of there being too many chiefs and not enough Indians. I should be glad to know more about these steps. You refer to the fact that the pay-roll has been kept to the bare minimum and I should be glad to know whether this minimum was calculated or estimated. You say that a lean uncomplicated administrative structure has been developed. I assume that you mean that it is lean and uncomplicated compared with other similar organisations and again I should like to know more about this. You say also that the structure has been designed to provide the required level of service whilst minimising the total cost and I should like to see some figures in support of this assertion."

In reply, Mr. Lawrance said (8 July 1976) (he is quoted with his permission),

"You will appreciate that because of the time scale of the first re-organisation and the effects of the second internal 'shake-up', together with the lack of any pre-existing controlling and co-ordinating organisation for the Water Authority, that much of what was done was based on intuitive assessment and 'back of envelope' calculations. Thus it is not possible at this stage to retrieve the back up information that led to the decisions taken. Indeed the present lean organisation does not allow any staff time for any such retrieval even were the information readily accessible. The number of staff available to the Water Industry was collated by the Department of the Environment and by the working parties set up by local authorities in connection with the review of the water industry and known as provisional management units. These reports showed a surfeit of senior staff. Meetings of Divisional Managers and Headquarters staff looked

"into these aspects for both re-organisations and decided the number of first, second and third tier staffs which would be required to effectively operate the organisation. Excess numbers clearly existed and it was decided that these must not be integrated into the organisation nor generally allowed to increase the numbers of fourth tier staffs. To overcome the problem many of the senior staff were left with no reasonable alternative but to accept early retirement, but with a few staff taken on for ad hoc temporary posts required to allow the organisation to be set up and passed through the early stages of existence.

"The bare minimum of payroll was again an intuitive assessment of the numbers required and was arrived at from the limited number of staffs taken over compared with the numbers previously in the industry. There was an approximate reduction of 10% in the Severn-Trent Water Authority. After the filling of certain key posts, which were individually the subject of a critical assessment at both divisional and headquarter level, a total ban on recruitment was imposed to allow time to shake out a portion of any surpluses that might exist and the reassessment of required alterations is very critically assessed both prior to budget allocation and at times of changes of policy.

"The reference to a lean uncomplicated structure was not comparative and referred to the format adopted in the light of staffing constraints. The basic rule adopted by the Severn-Trent Water Authority to date has been that the required level of service is that to which the public have become accustomed and that no improvement to that level is allowed or sought. Nevertheless the meeting of legal constraints has been a major priority but estimates have been the subject of critical scrutiny to ensure minimal cost whilst achieving the foregoing standards.

"A review of a working party of different disciplines at headquarters set out appropriate grading levels for the staff at the senior level and also to ensure comparability between different disciplines. A model structure was evolved by that working party for guidance of divisions.

"I regret that the scientifically based information you request is not available but trust the foregoing may be of some use."

12.2 "Running Water - Divisional Reflections" by D.E. Lawrance, CEng, MICE, FIMunE
June 1976.

"Organisation

The risk that large scale reorganisation may produce too many chiefs and not enough Indians in the industry was appreciated at the outset. Positive steps were taken, through the production and refinement of the organisational structures, to overcome this: nevertheless some ill-informed criticism has occurred.

Aided by the comparatively large number of persons who have left the industry through retirement, etc., the pay roll has been kept down to the bare minimum and in the Severn-Trent Authority it is still less than before reorganisation. This has been achieved despite the need to produce the ever increasing amount of information required to enable the government, the Price Commission, the National Water Council and other bodies to exercise their respective roles and ensure overall co-ordination.

" A lean uncomplicated administrative structure has been developed in the Severn-Trent Water Authority. This is designed to provide the required level of service whilst minimising as far as possible the total costs. It endeavours to make the best use of the manpower existing within the industry. It is based upon the philosophy that headquarters acts as co-ordinator, leader and controller, whilst the divisions carry out operational activities as well as the necessary liaison with local authorities in their areas. The divisions carry out day-to-day works through their area organisations so that by keeping the routine operations close to the problems these functions are executed economically and effectively.

Deployment of resources has been improved as a result of reorganisation, and examples are:

- (a) Operational sewage disposal staff now effectively cover all reclamation plants, including the smaller ones previously without qualified supervisory staff.
- (b) Scientific staff are now available for both 'clean' and 'dirty' water operations whereas a number of the predecessor authorities did not have scientific expertise available to them to assist in the operation of their units nor to give advice upon new proposals. This is now being provided from the scientific staff inherited from other services and the rationalisation of laboratories has assisted the redeployment."

12.3 Appreciation

The time available for discussion at the conference was limited, but none of the points raised in the writer's letter of 17 June was raised there during the public session.

It would seem therefore that the statements made in Mr. Lawrance's paper and referred to in the writer's letter of 17 June 1976 were statements of a general character and are unsupported by, for example, the analysis of data. They are very positive statements which are not qualified in any way. They are the kind of statements that reflect what appears to be a common attitude to management matters among municipal engineers.

Mr. Lawrance refers in his letter of 8 July to the fact that parts of the organisation which he mentions in his paper were based on intuitive assessment.

Thus, this senior public service manager appears to regard management as still very much an art (vide Appendix 9, page 208) and does not consider

the possibility of its being a science. The contents of the paper itself, the lack of discussion on these matters, and the author's letter of 8 July serve to illustrate the present attitude of municipal engineers to the matters raised.

Appendix 13. Inter-authority Comparisons

Professor A. E. Thompson, Dr. P.H. Dean, and Professor J. R. Small of the Department of Accountancy and Finance, Heriot Watt University, submitted two memoranda (September and November 1975) (79) to the Committee of Enquiry into local government finance - the Layfield Committee.

The authors argue (inter alia) for the setting up of a new public sector unit charged with monitoring the comparative performance of local authorities in each of their various activities. They suggest that such a unit would have the following functions:

- "1. To set standards in terms of data, statistics and information for the purpose of making comparisons of cost and performance between local authorities.
2. To present data compiled according to these standards in the form of comparative indicators.
3. To make cost and performance comparisons of authorities using differing methods to carry out the same task.
4. To explain the relevance, meaning and limitations of the comparisons made, particularly by indicating the validity of comparisons between different authorities.
5. To publish findings in the form of a national report and of separate reports relating to each region, on an annual basis."

The Layfield Report (46) states (chapter 6, paragraphs 8 and 9):

"8. It is very difficult to assess the appropriate numbers of staff required to run local government services efficiently, whether at the point of contact with the public or in central administration. There are no agreed standards by which to measure the proper levels of staff generally and few criteria outside local government by which to set standards in such services as education, personal social services, police, fire or refuse collection. Moreover, the need for any given service varies greatly from one area to another. There are differences, as a proportion of the population, in the numbers of children to be taught, old people and children to be cared for, homeless to be housed and households to be served. Characteristics such as sparsity or concentration of population, accessibility and availability of buildings and need for urban renewal also differ greatly from one locality to another. Moreover, the standard of service and the way manpower should be deployed to provide that standard are political matters in which the choice is a local one. Indeed one of the principal reasons for the existence of elected local authorities is to allow such local choice."

"9. All these factors determine the numbers, grading and quality of staff required. To examine the actual staffing levels area by area or even of a few selected areas would have been a task beyond our scope. It is, however, surprising how little was known until very recently about the numbers of staff employed in the various services provided by local authorities. The Joint Staff Watch newly instituted by the Department of the Environment and the local authorities should make it easier to monitor staff levels in future. "

In the conclusions to chapter 6, the Layfield Report (46) states (paragraphs 49 and 50):

"49. The best way to promote all-round efficiency and value for money by external means is through the dissemination of information on best practices to enable true comparisons to be made. The external auditors of local authority accounts are best equipped to provide suitable comparisons; no other body, existing or proposed, could do the job with as much economy of effort. But the audit service needs to be reorganised for the role and should be more independent of local authorities and government departments. We make proposals for achieving this which include the extension of audit accountability to a new higher institution.

"50. Professional associations of local authority officers and central advisory agencies play an important part in promoting efficiency but the functions of the latter tend to proliferate and should be rationalised where possible. "

It is suggested that the work reported in chapter 2 of this thesis goes some way to meeting the need for comparative information, so far as technical services is concerned.

REFERENCES

- 1 IME Journal, Vol. 94 page 357.
- 2 " " Vol. 96 " 305.
- 3 " " Vol. 96 " 163, 191 and 192.
- 4 " " Vol. 97 " 234.
- 5 " " Vol. 96 " 160.
- 6 " " Vol. 96 " 191.
- 7 Lupton, Tom. Money for effort, DSIR, HMSO, 1961.
- 8 Staffing of Local Government (Mallaby Report), HMSO, 1967.
- 9 Highway maintenance (Marshall Report), HMSO, 1970.
- 10 Transport Planning (Sharp Report), HMSO, 1970.
- 11 The New Local Authorities, management and structure (Bains Report)
 HMSO, 1972.
- 12 Wheatcroft, Mildred. The Revolution in British Management Education,
 Pitman, 1970.
- 13 Chapman, Richard A. Teaching Public Administration, Joint
 University Council for Social and Public Administration, 1974.
- 14 Brown, R.G.S. The Administrative Process in Britain, Methuen,
 University Paperback, 1973.
- 15 Mid-career training, ICE, IMunE, I StructE, 1974.
- 16 Forrester, Jay W. Industrial Dynamics, The MIT Press and John
 Wiley and Sons, 1961.
- 17 Koontz, Harold, and O'Donnell, Cyril. Principles of Management,
 4th edition, McGraw-Hill, 1968.
- 18 Baker, R.J.S. Administrative Theory and Public Administration,
 Hutchinson University Library, 1972.
- 19 Hanika, F. de P. New Thinking in management, Heinemann, 1972.
- 20 Sturt, George, The Wheelwright's Shop, quoted in The Open Air,
 by Adrian Bell, Faber, 1936.

- 21 Performance and size of local education authorities, Research
Studies 4, The local government operational research unit
and the Royal Institute of Public Administration for the
Royal Commission on Local Government in England, HMSO, 1968.
- 22 Economies of Scale in local government services, Research Studies 3,
The Institute of social and economic research, University of
York, for the Royal Commission on Local Government in
England, HMSO, 1968.
- 23 News Summary, Vol. 20, No. 4, August 1976, page 7.
- 24 Drucker, Peter. Management, tasks, responsibilities, practices,
Heinneman, 1973, page 69.
- 25 Local Government Boundary Report for England No. 1, November 1972.
- 26 Local Government in England - government proposals for reorganisa-
tion, Cmnd 4584, February 1971.
- 27 Fayol, Henri. General and Industrial management, Pitman.
- 28 Drucker, Peter. The Practice of Management, Pan Piper.
- 29 ACAS Guide No. 1 Job Evaluation.
- 30 Hertzberg, F., Mausner, B., and Snyderman, B. The motivation to
work, John Wiley and Sons, 1959.
- 31 Martin, A. S. 'An introduction to management in municipal
engineering', IME Journal, Vol. 97, August 1970.
- 32 Attitudes in British Management, A PEP Report, Penguin Books 1966.
- 33 Education and training of civil engineers, ICE 1975.
- 34 Clutterbuck, Vice-Admiral Sir David. The Times, 23 June 1976.
- 35 Wade, Major General Ashton. The Times, 26 June 1976.
- 36 Buswell, David. The Times, 26 June 1976.
- 37 Kelly, R. W. 'The management education and training of municipal
engineers in England and Wales', IME Journal, Vol. 103,
April 1976.
- 38 Municipal Engineering, 30 January 1976, page 150.

- 39 Municipal and Public Services Journal, 30 January 1976, page 115.
- 40 Report of the Royal Commission on Local Government in England,
1966-69, Vol. II.
- 41 Municipal and Public Services Journal, 25 June 1976, page 745.
- 42 " " " " " " " " page 748.
- 43 " " " " " 17 September 1976, pages
1034 and 1037.
- 44 Municipal and Public Services Journal, 24 September 1976, page 1073.
- 45 Municipal Engineering, 24 September 1976, page 1413.
- 46 Local Government Finance (Layfield Report), HMSO, 1976.
- 47 'Public Administration and management', PAC Bulletin No. 11,
Dec. 1971.
- 48 Xenophon, The Persian Expedition, Penguin Books 1949.
- 49 Martin, A. S. IME Journal, Vol. 103, June 1976, page 96.
- 50 CIPFA Return of Rates, Chartered Institute of Public Finance and
Accountancy, annually.
- 51 The Municipal Year Book, Municipal Journal Ltd.
- 52 Friedman, Milton. The Times, 23 August 1976.
- 53 Jevons, William Stanley. Essay, 1863.
- 54 Taylor, F. W. The Principles of Scientific Management.
- 55 Hamilton, A. S. 'The evolution of municipal engineering', IME
Journal, Vol. 82, 1955-56.
- 56 Gauntlett, H. Donovan. 'Enquire within alias O & M', IME Journal,
Vol. LXXVIII, 1951-52.
- 57 Turner, A. S. 'Essentials for a modern engineer', IME Journal,
Vol. 83, 1956-57.
- 58 Hawkins, M. R. 'Budgetary control in a public works department',
IME Journal, Vol. 95, 1968.
- 59 Mustow, Stuart. 'The engineer - a manager?' IME Journal,
Vol. 97, 1970.

- 60 Brief bibliography, IME Journal, Vol. 96, 1969, page 163.
- 61 Minkes, A. L. A list of introductory books, IME Journal, Vol. 96, 1969.
- 62 Wikeley, J. B. Municipal Engineering Law and Administration, CR Books Ltd., 1964.
- 63 Howard, Mrs. B. M. 'The management of management literature', Management Services in Government, Vol. 29, No. 2.
- 64 Elford, E. J. Municipal Engineer and Surveyor's Department, Pitman, 1928.
- 65 Parsons, O'Herlihy and Rowe. Management in Civil Engineering, Spon, 1965.
- 66 Seeley, I. H. Municipal engineering practice, Macmillan, 1967.
- 67 Skeat, W. O., editor. Manual of British water engineering practice, 4th edition, 1969, W. Heffer and Sons Ltd.
- 68 Self, Peter. Administrative theories and politics, George Allen and Unwin, 1972.
- 69 National Board for Prices and Incomes Report No. 29, The pay and conditions of manual workers in Local authorities, the National Health Service, Gas, and Water Supply, 1967, Cmnd 3230.
- 70 Circular NM 190, 21 October 1968, of the National Joint Council for local authorities services (Manual workers).
- 71 Dalton, Melville. 'The Industrial "rate buster": a characterisation', from Applied Anthropology, Winter 1948, included in Payment Systems, Penguin modern management readings, editor, Tom Lupton, 1972.
- 72 Roy, Donald. 'Quota restrictions and goldbricking in a machine shop', from American Journal of Sociology 1952, included in Payment Systems, Penguin modern management readings, editor, Tom Lupton, 1972.

- 73 Whyte, William Foote. 'Economic incentives and human relations', from Harvard Business Review, Vol. 30, No. 2, 1952, included in Payment Systems, Penguin modern management readings, editor, Tom Lupton, 1972.
- 74 Action on the Banwell Report (The Potts Report), HMSO, 1967.
- 75 National Board for Prices and Incomes Report No. 45, Pay of chief and senior officers in local government service and in the Greater London Council, Cmnd 3473, 1967.
- 76 Guidelines on education and training for management, CEI Statement No. 9, 1971.
- 77 Bayton, James A., and Chapman, Richard L. Transformation of scientists and engineers into managers, National aeronautics and space administration, 1972.
- 78 Lawrance, D. E. 'Running water - divisional reflections', IME annual conference, 1976.
- 79 Thompson, A. E., Dean, P. H., and Small, J. R. Memorandums to the Layfield Committee on local government finance, unpublished.

BIBLIOGRAPHY

- 1 Journal of the Institution of Municipal Engineers, Vols. 1 - 98.

