

This item was submitted to [Loughborough's Research Repository](#) by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

Management accountancy and the construction industry

PLEASE CITE THE PUBLISHED VERSION

PUBLISHER

Loughborough University of Technology

LICENCE

CC BY-NC 4.0

REPOSITORY RECORD

Goodlad, J.B.. 2020. "Management Accountancy and the Construction Industry". Loughborough University.

MANAGEMENT ACCOUNTANCY
AND
THE CONSTRUCTION INDUSTRY

A thesis submitted for a Master of Science degree of
the University of Technology
Loughborough

Department of Industrial Engineering and Management

J.D. GOODLAD

JULY 1971



Loughborough University Of Technology Library	
Date	Nov. 71
Class	
Acc. No.	022617/02

MANAGEMENT ACCOUNTANCY

AND

THE CONSTRUCTION INDUSTRY

A study of the techniques associated with management
accountancy : their usage and possible development in
the Construction Industry.

INTRODUCTION

The theme of this research thesis originally suggested itself as a result of the interest shown in the paper entitled "Management Accounting and Industrial Management" (51). Subsequently, as a result of contact with the Department of Civil Engineering, it became obvious that a similar research programme could be conducted to advantage in relation to the construction industry: i.e. such an approach, allied with a consideration of the possible development of the various management accountancy techniques in the industry, could make a contribution to the academic research of the subject.

The task undertaken was to assess the accounting needs of management, the utilization of the various techniques to fulfil these needs, and a consideration of areas for possible development; the assessment is essentially a qualitative one, although some attempt to "quantify" has been effected by including practical case-study material.

In order to fully appreciate the significance of management accountancy in the industry, it was thought advisable to create a framework and this was established in two ways. First, the industry was studied, i.e. the general structure of the industry, its management structure and the accounting needs of construction management; secondly, those techniques normally associated with management accountancy and which were considered appropriate to the construction industry bearing in mind the inherent constraints, have been considered.

Within this framework was then assessed the relevance and usage of the techniques in the industry; in order to obtain a

reasonable degree of accuracy, information was collected from quantity surveyors, consultants, directors, accountants, managers and foremen. Various contractors' offices and sites were also visited and as a result case studies were included in order to add to and substantiate evidence in relation to the industry's approach to management accountancy.

Each technique was then reconsidered in relation to the peculiarities of the construction industry and possible modifications and developments were formulated in each case within the natural limits of the thesis. In order to project these concepts into the future, the conclusions encompass responsibility for such development, although it is appreciated that within the terms of the thesis, such suggestions for the modification and development of existing techniques are far from exhaustive.

No truly academic research can ever be said to be complete but the methodology of this thesis has been evolved, within the parameters previously stipulated in order to create a self-contained appraisal which may facilitate future research study of the relevance of the various techniques associated with management accountancy to the construction industry. It is suggested that this approach may possibly have resulted in the creation of a source for research development, either for accountants who require an insight into this challenging industry, or the technical manager of the industry who may or may not be a post-graduate in construction management.

INDEX

<u>TITLE</u>	<u>MANAGEMENT ACCOUNTANCY AND THE CONSTRUCTION INDUSTRY</u>	<u>Page</u>
<u>PREFACE</u>		3
<u>INDEX</u>		5
<u>LIST OF FIGURES</u>		14
<u>ACKNOWLEDGEMENTS</u>		17
<u>SYNOPSIS</u>		22
<u>PART I</u>	<u>INTRODUCTION</u>	
	General Introduction	27
<u>PART II</u>	<u>THE STRUCTURE AND SIGNIFICANT FEATURES OF THE CONSTRUCTION INDUSTRY</u>	
Section 1	The Structure of the Industry	
	Trades of the Industry	30
	Size of firms in the Industry	32
Section 2	Significant Features of the Industry	33
	(a) Construction Planning	34
	(b) Operational Pattern of a Contract	38
	(c) The Role of Design	39
	The Roles of Architect, Quantity Surveyor and Estimator	42
Section 3	The Management Framework and Processes in Industry	43
Section 4	The Management Structure of the Individual Company	45
Section 5	The Accounting Needs of Management in the Construction Industry	48
	Time and Cost Analysis	51
	The Needs of Higher Management	51
	The Needs of Lower Levels of Management	54

Index

		Page
<u>PART III</u>	<u>TECHNIQUES ASSOCIATED WITH MANAGEMENT</u>	
	<u>ACCOUNTANCY</u>	
Section 1	Introduction	60
Section 2	The Nature of Management Accountancy	61
Section 3	Techniques associated with Management Accountancy	63
	Internal Audit	64
	Marginal Costing	65
	Break-Even Analysis	67
	Long-term Forecasting and Planning	75
	Budgetary Control	78
	Standard Costing	81
	Capital Expenditure Project Assessment	84
	Internal Ratio Analysis	88
	Interfirm Comparison including Uniform Costing	89
 <u>PART IV</u>	 <u>AN ASSESSMENT OF THE EXTENT TO WHICH THE</u>	
	<u>VARIOUS MANAGEMENT ACCOUNTANCY TECHNIQUES</u>	
	<u>ARE CONSIDERED RELEVANT TO THE CONSTRUCTION</u>	
	<u>INDUSTRY</u>	
Section 1	Introduction: System of procedure	93
Section 2	The Preliminary Questionnaire circulated to Quantity Surveyors:	
	Design of Questionnaire	94
	Commentary on Replies	95
Section 3	The Consultant's Viewpoint	
	Introduction	103
	Consultants' Views: General Comment	104

Index

PART IV

Section 3 (continued)

Reporting of Accounting Information	105
Dual Tenders	105
Influence of the various organisations associated with the Industry	105
Contract Execution	106
Influence of accountants in the Industry	106
Usage of the various techniques	106
Other techniques	109
Conclusion	109

Section 4

The Detailed Questionnaire circulated to accountants and managers:

Design of Questionnaire	110
Response to Questionnaire	111
Commentary on Replies	112
Nature and extent of the activities of the firms	112
Analysis of response	112
The Management and their accounting needs	112
(i) Higher Management	112
(ii) Site Management	113
Tendering and Estimating Procedures	114
Influence of the various organisations associated with the Industry	115
The Accountant and the techniques used by him	115
Techniques Used	115
Introduction	115
Various techniques (Part III - Section 3)	123

Index

Part IV

Page

Section 5	Six Case Studies	
	Introduction	126
	Case Study A - A large contractor	127
	" " B - A medium-sized contractor	136
	" " C - A small contractor	140
	" " D - A sub-contractor	144
	" " E - A successful contractor	162
	" " F - A contractor using	
	Budgetary Control in	
	conjunction with Standard	
	Marginal Costing	172
	Case Studies : conclusion	191

PART V

POSSIBLE DEVELOPMENTS OF THE MANAGEMENT ACCOUNTANCY TECHNIQUES IN THE CONSTRUCTION INDUSTRY

Section 1	Introduction	193
Section 2	The techniques; their relevance and possible development:	
	Internal Audit	195
	Organisation and Methods	196
	Information Audit	197
	Marginal Costing	
	Tendering	198
	Interim Valuations	199
	Seasonal Costs	200

Index

PART V

Page

Section 2 (continued)

Break-Even Analysis

General Application 202

Contract Profitability 202

Consideration of Alternatives 205

Long-Term Forecasting and Planning 207

Marketing and Market Research 207

Marketing Audit 208

Budgetary Control and Standard Costing 210

Budgetary Control

Head Office Costs 210

Cash Control 214

Standard Costing 214

Operational Bills 215

The Operational Bill as a basis for

Standard Costing and Budgetary Control 219

Procedures

Outline of procedures 220

Development of procedures 220

(a) The Scope of the contract 220

(b) The Work operations and their
sequence 220

(c) Calculation of "standard"
operation costs 221

(d) 1. Construction of a Contract
Budget as basis of tender 222

11. Construction of a Contract
Budget for Site Control 223

Index

		Page
<u>PART V</u>		
Section 2 (continued)		
	(e) & (f) Extraction of actual costs and their comparison with Contract Budget	224
	(g) & (h) Prompting or taking of action to eliminate future variances	225
	Conclusion	226
	Capital Expenditure Project Assessment	226
	Internal Ratio Analysis	227
	Profit Planning	228
	Evaluation of Business	229
	Important Ratios	229
	Inter-firm Comparison (including Uniform Costing)	230
	Other techniques	234
	Model Building	235
	Management By Objectives	237
	Conclusion	239
<u>PART VI</u>	<u>CONCLUSIONS</u>	
Section 1	General Introduction	241
Section 2	Management Structure, the accounting needs of management and the role of the accountant	243
Section 3	The Use and Relevance of Management Accountancy Techniques	245
Section 4	Possible Development of the Techniques	247
Section 5	Responsibility for Development Introduction	250

Index

PART VI

Page

Section 5 (Continued)

The Responsibility of the Industry	250
The Responsibility of the Education and Training Institutions	253
The Responsibility of the Client	257
The Responsibility of the Individual Accountant	253

APPENDIX	1	List of Trades in the Construction Industry	262
	2	Nature of the Bill of Quantities	263
	3	Calculation of Profit for Tendering Purposes	265
	4	Distribution of labour over period of contract	267
	5	Typical Contract Progress Curve	268
	6	System of Control	269
	7	Probability Theory	270
	8	Flexible Budgeting	271
	9	Types of Standard Cost	272
	10	Discounted Cash Flow Technique: Present Value Factors at 20%	273
	11	Preliminary Questionnaire	274
	12	" " - summary of replies	275
	13	Detailed Questionnaire	276
	14	" " - summary of response	286
	15	Summary of Replies to Questionnaire - Company	287
	16	" " " - Higher Management	288
	17	" " " - Site Management	290

Index

		Page
APPENDIX 18	Summary of Replies to Questionnaire - Site Foreman	291
19	The Site Foreman and Accounting Information - Visits to Construction Sites	292
20	Summary of Replies to Questionnaire - Tendering and Estimating	294
21	" " " - Influence of Organisations	295
22	Detailed Questionnaire - The Accountant and his role - summary of response	296
23	Use of Techniques - tabulation	297
24	" " - construction compared with general industry - tabulation	298
25	Use of Techniques - construction compared with general industry - graph	299
26	Survey of Published Accounts 1968/69 - Profit inclusion	300
27	Short term profitability comparison for 1968; "F" Ltd.	301
28	Contract Profit Calculation for Company Profit & Loss A/c. inclusion	302
29	F (Contractors) Ltd. - Cost Sections	304
30	" " " - Expense Classification	305
31	Budgetary Control - Cash Flow	307
32	Deviation Curve - Tenders v. Contracts	308
33	Calculation of Standard Labour Cost	309
34	A Precedence Diagram	310
35	Graph of Variance in money terms	311

Index ---

		Page
APPENDIX 36	Graph of Variance as % of standard cost	312
37	Contract Cost Control Statement	313
38	Profit and Loss Statement incorporating Budgetary Control and Standard Costing	314
39	Interfirm Comparison - diagram of main ratios (Building & Civil Engineering)	316
40	Interfirm Comparison - Financial Charges & Capital Structure Ratios	316
41	English Universities - Management Courses	317
42	Royal Institute of British Architects - Management Courses 1970/71	318
43	Construction Industry Training Board - Management Courses	319
44	Loughborough University - Industrial Ph.D.	321
BIBLIOGRAPHY		322

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
1	Structure of Construction Industry - analysed by trade of firm	31
2	Structure of Construction Industry - number of firms and value of work done	32
3	Relationship between pre-tender and contract periods	35
4	Contract Costs in relation to Time Factor	37
5	Operational Pattern of a Contract	38
6	Inter-relationship between Architect and Contractors' Designers	40
7	Roles of Architect, Quantity Surveyor and Estimator	42
8	Processes of Management and their inter- relationships	43
9	Organisation Chart : Construction Project	47
10	Accounting Needs of Management : "Control Loop"	48
11	System of Contract Control	49
12	Time-Cost Curves	52
13	Contract Profit - Graphical Presentation	56
14	Conventional Break-Even Chart	68
15	Profit Chart	69
16	Alternative Presentation of Break-Even Chart	71
17	Comparative Profit Chart	73
18	Use of Techniques in Construction Industry - Summary	117

List of Figures

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
19	Total Use of Techniques - graphical comparison	118
20	Extensive Use of Techniques - graphical comparison	119
21	Extensive Use of Techniques - additional graphical comparison	120
22	Use of techniques - weighted comparison between Construction Industry and industry in general	122
23	Case Study A - Group Profit Target Schedule	132
24	" " D - Estimated Cost Sheet	151
25	" " " - Purchase Day Sheet	152
26	" " " - Contract Progress - Site Labour	153
27	" " " - Contract Progress - Site Materials	155
28	" " " - Direct Labour Statistics	157
29	" " " - Contract Progress Report	158
30	" " " - Contract Progress Summary	159
31	" " " - Site Supervisor's Report	160
32	" " " - Inter-relationships of Schedules	161
33	Case Study B - Summary of Consolidated Accounts for 6 years	163
34	Case Study F - Monthly Operating Statements	178

List of Figures

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
35	Case Study F - Balance Sheet	179
36	" " " - Operating Summary - All Classes	180
37/40	" " " - Operating Summaries - Classes of work "A" "B" "C" & "D"	181
41	" " " - Statement of Establishment Charges	185
42/45	" " " - Contract Progress Statements - Classes of work "A" "B" "C" & "D"	186
46	Break-Even Chart : a "Construction" Company	203
47	Contract Break-Even Chart	204
48	Relationship between Contracts : Cash Resources	206
49	Comparative Capital & Maintenance Costs - graphical presentation	206
50	Inter-relationship between Budgetary Control and Standard Costing	211
51	" " " " - alternative "Marginal Cost" presentation	212
52	Interfirm Comparison - Simple Pyramid of Ratios	233

ACKNOWLEDGMENTS

The preparation and completion of this thesis would not have been possible without the help of many individuals, companies, etc.; details of this assistance follow and are hereby gratefully acknowledged.

Reading the thesis either in part or in total and offering
useful criticism and guidance.

Professor E.G. Trimble, B.Sc., C.Eng., F.I.C.E., M.I.Mech.E.,
M.I.Struct.E.,

Professor of Construction Management,

University of Technology,

Loughborough.

Professor J. Sizer, B.A., A.C.W.A., A.M.B.I.M.,

Professor of Financial Management,

University of Technology,

Loughborough.

H.A. Fawthrop, B.A., Ph.D., F.C.W.A.,

Director of Post-graduate Studies,

Department of Financial Control,

University of Lancaster.

P.F. Miller, A.I.O.B., M.I.B.,

C.I.R.I.A. Research Fellow,

University of Technology,

Loughborough

Acknowledgements

B.C. Jupp, F.R.I.C.S., F.I.Ae.

Visiting Lecturer/Research Fellow,

University of Technology,

Loughborough.

D.J. Viner, F.A.C.C.A., F.C.W.A., J.Dip.M.A.,

Ex-Joint Deputy Managing Director,

Jersey-Kapwood Ltd.,

Nottingham.

Research Officer of the Institute of Cost &

Works Accountants.

Visiting Lecturer,

University of Nottingham.

Management Consultant.

D.B. Haynes, A.C.I.S., A.A.C.C.A.,

Company Accountant,

Rolls Royce Ltd.

E.R. Skoyles, A.R.I.C.S., A.I.Q.S.,

Senior Quantity Surveyor,

Building Research Station,

Carston,

Watford.

Acknowledgements

Completing the questionnaires (used for the collection
of data)

Quantity Surveyors attached to various Government Departments.

Directors, Consultants, Managers, Foremen and Accountants of
participating companies.

Provision of Case Study Material

The five participating companies.

S.A. Marshall, B.A.(Com.), A.C.A.

Practising Chartered Accountant.

Provision of additional information

L. Taylor Harrington,

Deputy Director,

Centre for Interfirm Comparison Ltd.

Professional Institutes - especially -

The Royal Institute of British Architects,

The Institute of Cost & Works Accountants

G.W. Payn, Esq. (Senior Lecturer in Civil Engineering)

The City University,

London.

Acknowledgements

Provision of additional help and comment.

The academic and secretarial members of the Departments of Industrial Engineering and Management (especially R.H.B. Condie, M.A. - Postgraduate Tutor) and the Department of Civil Engineering (University of Technology, Loughborough)

The library staff - University of Technology, Loughborough.

M. Mackerman, B.Sc. (University of Manchester)

G.J.J. Hunt, A.A.S.T.C., B.Sc.(Hons.) A.R.A.I.A., A.R.I.B.A.,
M.B.I.M., A.P.A.I.M.,

Professional, Administrative, Personnel & Planning
Consultant

John Humble (Urwick, Orr & Partners Ltd.)

D.B. Roy, Dipl.Arch., A.R.I.B.A.,

Estates Bursar,

University of Technology,

Loughborough.

A.C.H. Pullen,

Clerk of Works,

University of Technology,

Loughborough.

Robert Willott - Editor - Accountancy Age.

Staff of the Construction Industry Training Board.

A.G. Sims, A.C.W.A. (Building Research Station),

Chairman of I.C.W.A. Study Group,

(Construction Industry).

Acknowledgements

Association of Certified & Corporate Accountants

Institute of Building

Building Management & Marketing Consultants Ltd.

Managers & foremen of various construction sites visited.

Staff of the Building Research Station

Typing and checking

Mrs. H. O'Connor

Corrigenda arising from comments of external examiners

p.46 (para.2) It is unusual for a site manager to be a professional civil engineer although he may have other technical qualifications: (see Appendix 17 p.290)

p.122 (Figure 22) Indicated extent of comparative utilisation to be interpreted after severe qualification; p.111 para.4 states (correctly) that "the (original) replies must be viewed with reservation". Therefore the percentages included in the tabulation are higher than actual (total) utilisation. Also qualification Note p (p.122) indicates "limited rather than extensive" application and even in the latter category there exists a lack of sophistication e.g. standard costing - Case Study B p.138 & Appendix 25/Note p.299.

p.264 (Appendix 2) Time required = 4.7 days (& not 4 days).

p.267 (Appendix 4) The 3 distribution curves enclose the same areas: (in addition see Figure 12 p.52).

SYNOPSIS

The aims of the thesis are first to consider the accounting needs of the construction management together with a background study of the industry and secondly to examine some of the techniques associated with management accountancy and the extent to which they are being used and developed as a means of meeting the information needs of management in the construction industry. Thirdly, the thesis includes a consideration of the areas in which some of the techniques could be more extensively applied and developed, and finally in regard to this development, the responsibilities of the industry, the education and training institutions and the individual accountant are considered.

The study of the structure of the industry, the accounting needs of management and the various techniques associated with management accountancy, necessitated a search of the available materials in order to assess the extent to which the techniques are relevant to the construction industry, and are being used and developed, a simple questionnaire was circulated to quantity surveyors in their capacity as the industry's "economists/accountants", also various consultants associated with the industry were approached in order to substantiate or otherwise the potential indicated by the quantity surveyors, both groups having experience of dealing with different sized contractors within the industry. In addition, a second and more detailed questionnaire was sent to directors, managers, site foremen and accountants, in order to establish indications as to the actual use and development of the techniques in the industry; where responsive organisations indicated their willingness to co-operate, they were visited in order to evolve a more accurate assessment of their

individual situations and their resulting approach and attitudes to the creation and maintenance of a management information system. Finally, two of the latter have been treated as representative of different sized companies in the industry, i.e. large and medium-sized and are included in the thesis as case-study material, together with similar material in respect of three other companies who have significant features in connection with sub-contract work, development of certain techniques and/or a record of success within the industry: although a hypothetical case study is used as representative of the small sized contractor, the details included therein are confirmed by those responsive companies in the same category.

Although it is concluded that the construction industry is an extremely heterogeneous one, it is contended that many of the techniques may be both used and developed by the management accountant in the industry; the results of the research undertaken indicate that the techniques associated with management accountancy are being used throughout the industry, and companies in the medium to large range are applying and developing various of the techniques to advantage: however very limited use seems to be the case in the small firm. The extent of usage of the various techniques within the construction industry compares favourably with the use throughout industry: however, there is scope for both an increase in the general use of the techniques, and also for development, modification and improvement of those techniques which are in present use, e.g. budgetary control as a vital aid in the sphere of cash control could be more extensively developed as could standard costing as a means of facilitating site control.

Responsibility for such development is a corporate one but main responsibility rests with higher management who should encourage

a regular interface between the accounting staff and site management: site managers and foremen should be made to feel involved in the financial implications of contract work. Education in the techniques of management accountancy should be included in the systematic development of junior and middle management, and firms should utilize the available educational facilities. Joint research between the firm's staff and the staff of a nearby University should be encouraged and every opportunity to introduce scientific management should be considered in order to attract the right calibre of accountant. It is also concluded that the Construction Industry Training Board could initiate a degree of rationalisation in the educational facilities by working with the various universities, polytechnics and professional bodies in order to provide a nationwide network of courses geared to the requirements of different sized organisations: universities should also create inter-disciplinary research teams to work on some industrially significant problems. As far as the accountancy institutes are concerned there are few signs of direct interest in the construction industry.

The individual accountant must become more involved in the general management scene and be willing to act not only as a financial steward but as a financial adviser. He must realise that the successful application of management accountancy techniques requires the closest co-operation between himself and technical management and he must also orientate his company towards a profit-geared policy. In the construction industry where site management is geographically separated from the accountant, the need for well-presented information is extremely important; in this sphere the accountant can make a significant contribution.

It is finally concluded that in view of the magnitude of the construction industry, any increase in efficiency resulting from the increased utilisation and development of the techniques associated with management accountancy, should make a vital contribution to an improvement in the economy of the United Kingdom.

PART I

INTRODUCTION

PART I

INTRODUCTION

General Introduction

The main objective of this thesis is to consider the relevance of the various techniques associated with management accountancy to the construction industry.

It is first necessary to establish the context of the study and in particular the nature of the industry. Therefore the earlier part of the thesis endeavours to consider the broad structure of the construction industry; then as an extension to this broad framework the management structure of a construction company is considered in order to appreciate more fully the accounting needs of management in the industry. Such a review is considered useful whether interested parties are either new to, or have experience of, the industry.

Set against this background are then projected the details of some of the techniques normally associated with the concept of management accountancy: at a later stage in order to relate these techniques to the industry, some measure of their utilisation and development within the industry is attempted (via the analysis of questionnaires completed by various quantity surveyors, directors, accountants, managers and foremen). Where practicable, the data resulting from distribution and completion of the questionnaires is confirmed by information collected as a result of personal visits to offices and sites; this introduced the opportunity to obviate any difficulties and clarify points of terminology. Also in order to consider the situation from a different view point, various consultants were approached as to their experience of the construction industry

in connection with management accountancy.

Then, in an attempt to consider the total spectrum of the industry, various individual companies are studied in more detail in order to compare the application of the management accountancy techniques in various situations e.g. size of company, scope of activities, etc., and this research is reflected in the various case-studies included in this thesis.

After the general appraisal of the industry and a specific consideration of the case-study material, the thesis then includes a study of the extent to which the various techniques may be developed and modified.

Finally, by inter-relating the fact of the usefulness of the various management accountancy techniques in other industries to the indications of their use in the construction industry, some consideration is made as to the relevant responsibilities of the construction industry itself, the universities and technical institutions, various professional bodies and the individual accountant, in regard to the development of these techniques.

PART II

THE STRUCTURE AND SIGNIFICANT FEATURES

OF THE

CONSTRUCTION INDUSTRY

PART II

THE STRUCTURE AND SIGNIFICANT FEATURES OF THE CONSTRUCTION INDUSTRY

Section 1

THE STRUCTURE OF THE CONSTRUCTION INDUSTRY

Trades of the Industry

The construction industry is an extremely heterogeneous one, including general builders, civil engineering contractors, plumbers, painters, etc. (see figure 1 and Appendix 1)

General builders represent 43% of the total number of firms but only account for a quarter of the total value of work done by the industry; in contrast, the larger building and civil engineering contractors whilst representing only 4% of the total number of firms account for 35% of the total value of work done.

(It should be indicated at this preliminary stage that one of the facets of this thesis is to appreciate the relevance of the various techniques to the contractor, although as may be fully appreciated it is acknowledged that the industry encompasses many other important members. This fact is reflected in a recent report (89) which states that - 'It takes but two words to express the 'construction industry', but their meaning is variable and complex. This industry includes a range of sectors, from the designers to the manufacturers of materials, and the contractors and sub-contractors who execute the construction'. Although reference will be made to these other members, the main theme is related to the latter group, i.e. those who execute the construction.)

STRUCTURE OF CONSTRUCTION INDUSTRY

Analysed by Trade of Firm

(as at April 1968)

Trade of Firm	Number of Firms	%	Value of Work Done (£M)	%
General Builders	34,293	43	223.5	25
Building & Civil				
Engineering Contractors	3,056	4	321.6	35
Civil Engineers	1,514	2	87.0	9
Plumbers	8,316	10	30.5	3
Joiners & Carpenters	5,535	7	18.6	2
Painters	13,509	17	27.8	3
Roofers	1,512	2	16.9	2
Plasterers	3,115	4	13.2	1
Heating & Ventilating Engineers	1,353	2	43.4	5
Electrical Contractors	4,346	5	43.3	5
Plant Hire	1,200	1	23.3	2
Others ^M	2,305	3	73.1	8
<hr/>				
	80,059	100	927.2	100
<hr/>				

^M See Appendix I for fully
comprehensive list

Source : Construction
Statistics - 1968 - H.P.B.W.

FIGURE 1

Size of firms in the Industry

There is a preponderance of small firms in the construction industry (see figure 2) e.g. over 96% of the firms employ less than 60 people.

<u>STRUCTURE OF CONSTRUCTION INDUSTRY - 1968</u>					
<u>Number of Firms and Value of Work Done</u>					
<u>Size</u>	<u>NIL - 59</u>	<u>60 - 299</u>	<u>300 - 1199</u>	<u>1200 & over</u>	<u>Total</u>
Number (As at April 1968)	77,008	2,548	416	87	80,059
%	96.2	3.2	.5	.1	100%
Value of Work Done (£M) (1st quarter)	318.4	214.9	178.3	215.6	927.2 *
%	34.3	23.2	19.2	23.3	100%
* 1968 - Annual Value of Work Done (£M) By Contractors 3,881 By Operatives directly employed by public sector 686 GRAND TOTAL £4,567					
(Annual Bulletin of Construction Statistics (M.P.B.W.) - 1968)					

FIGURE 2

It is important to appreciate that over 57% of the total value of work done by the industry originates from these and other firms which employ less than 300, as an analysis on a cumulative scale illustrates:-

<u>Size of firm</u> (number employed)	<u>Number of firms</u> (%)	<u>Value of Work</u> (%)
0 - 59	96.2	34.3
0 - 299	99.5	57.5
0 - 1199	99.9	76.7
0 - 1200 & above	100	100

As will be discussed at a later stage (Part IV), within the context of a consideration of industries other than the construction industry, it may be considered impracticable to apply the full range of techniques associated with management accountancy to these smaller firms. However, this surmise may merely be a question of degree, i.e. in a practical situation there could be the possibility of a limited application of a particular technique: considering the important contribution of the smaller firm in the construction industry, this principle is important.

Having briefly considered the structure of the construction industry in terms of the trades and sizes of firms, the next section will be concerned with the significant features of the industry.

Section 2

SIGNIFICANT FEATURES OF THE CONSTRUCTION INDUSTRY

The Construction industry has certain significant features which are now considered under the headings of:-

- a) Construction Planning,
- b) The Operational Pattern of a contract and
- c) The Role of Design,

although it will be appreciated that there exists an inter-relationship between these three areas.

(a) Construction Planning (102)

In the construction industry, the use of planning methods are associated with the two main stages in the construction cycle period, as follows:-

Stage I - Pre-tender period

Stage II & III - Contract period

The inter-relationship between these periods is shown diagrammatically in Figure 3.

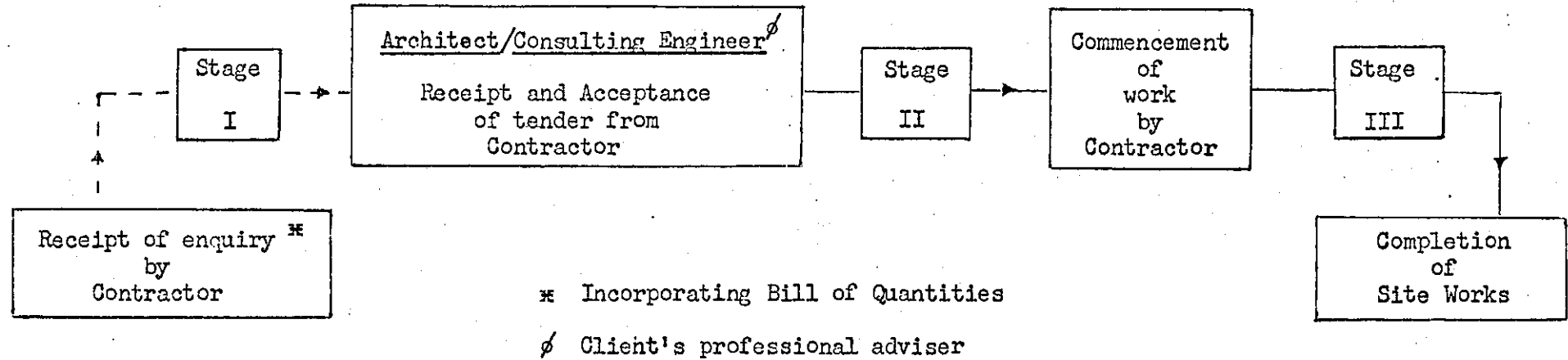
Let Stage I (the pre-tender period) be now considered in more depth; a reasonable starting point is the pre-tender report which should cover at least the following details:-

- a) a brief description of the proposed project,
- b) the precise location of the project,
- c) the geographical details,
- d) an indication of accessibility, in particular connection with the transporting of materials,
- e) the details of availability of local labour,
- f) the scope of services, e.g. gas, water, which are available,
- g) local weather conditions,
- h) possible local sub-contractors.

At this pre-tender stage (I) it is important to appreciate the importance of comparing the various methods which can be applied to a particular construction project; analysis should be in money terms, whenever this is possible.

Although the initial pre-tender details may tend to be rather inaccurate, it must also be appreciated that the submitted tender is the natural result of this pre-tender plan, and also it may ultimately be used as a general basis for control of the actual contract should the

RELATIONSHIP BETWEEN PRE-TENDER AND CONTRACT PERIODS



- Notes
- (1) As a basis for more comprehensive control, the degree of detail will increase progressively between Stage I and Stage III.
 - (2) The additional Stage III is in respect of short-term site planning and should prove effective for say a period of 4 weeks or for a particular stage of work.

FIGURE 3

submitted tender be accepted by the client's professional adviser. If this proves to be the case, the contractor will normally plan the project work in much greater detail; important documentation to be considered in connection with this more detailed work is as follows:-

- a) detailed drawings of the proposed construction,
- b) detailed bill of quantities indicating possible requirements of the amount of materials required on the contract,

(See Appendix 2)

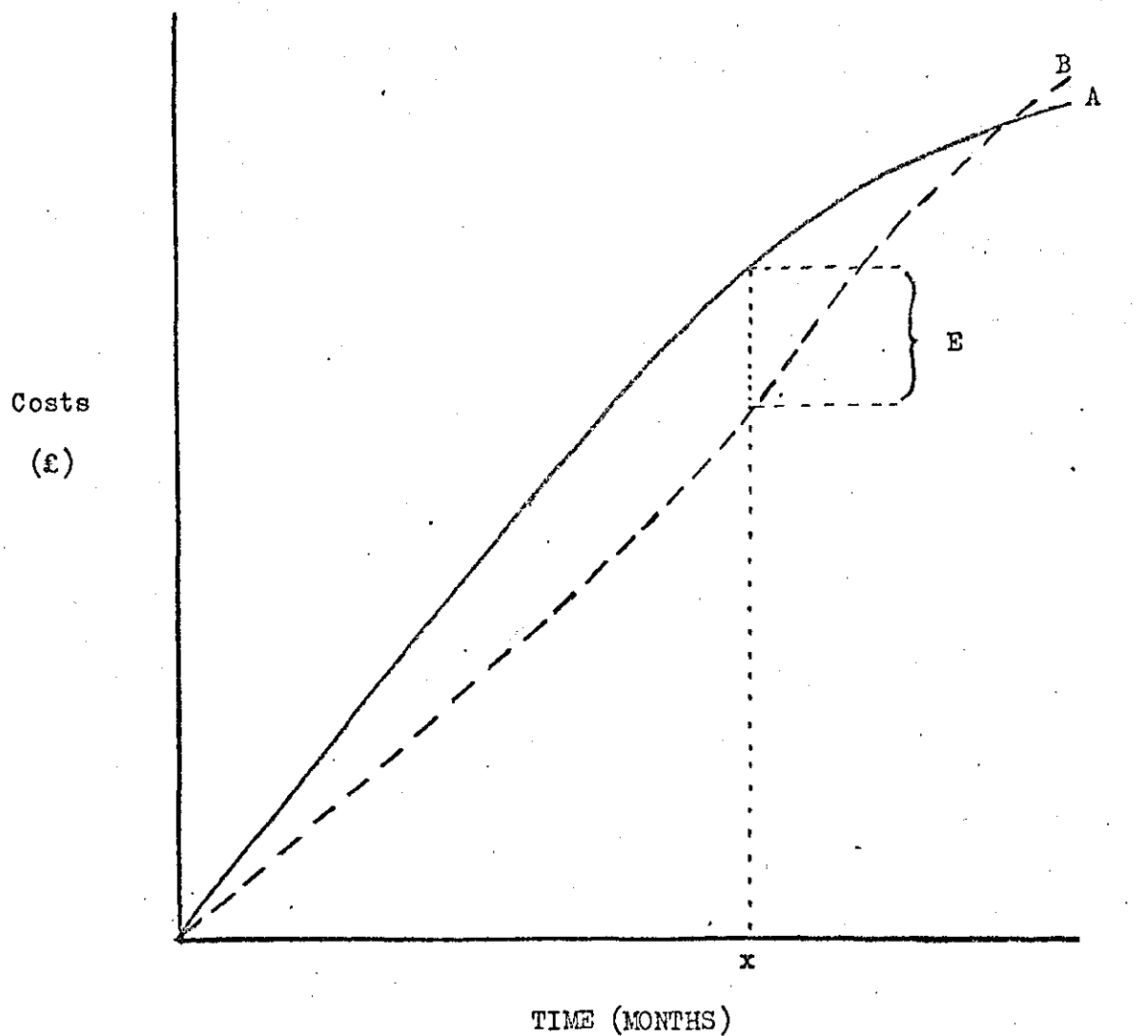
- c) labour requirement schedule, which is normally calculated from the quantity of work detailed on the bill of quantities which in turn is related to a man-hour factor according to the type of work involved. (Appendix 2) Graphical presentation of this information may contribute towards arriving at a more ideal distribution of labour over the contract period. (Appendix 5) It should also be appreciated that a controlled build-up, run-down and final dispersal of all factors of production, facilities, services and resources is a very important aspect of the construction industry. (Typical Progress Curve - Appendix 6)

- d) statement of construction methods to be used on the project, including a detailed re-examination of original methods advocated, and,

- e) statement of the financial considerations of the contract e.g. in the construction industry a very important aspect is the calculation of working capital requirements. This important factor is graphically illustrated in Figure 4.

This presentation highlights the very important fact that not only should the amount of spending be controlled, but also when the

Contract Costs in relation to Time Factor



B = Budgeted Costs

A = Actual Costs

E = Represents actual
spending (A) in excess
of budgeted spending
(B) at point in time
(x).

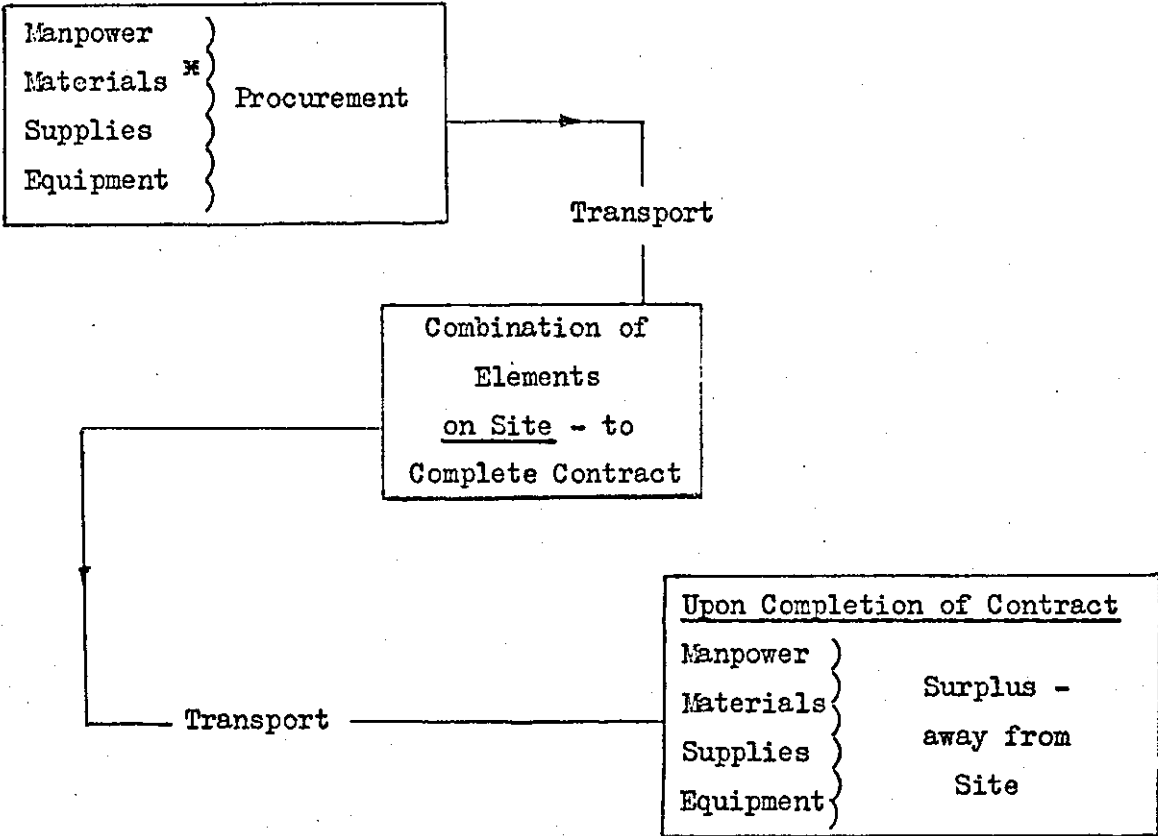
FIGURE 4

money is to be spent should be stressed and accordingly controlled. Actual and budgeted income may also be plotted to advantage either on the same chart or on a separate one in order to indicate more clearly cash flows and also profits/losses.

(b) The Operational Pattern of a Contract

The following diagram indicates the various factors involved in the operational pattern of a contract undertaken by a firm in the construction industry (Figure 5):-

Operational Pattern of a Contract



* To include pre-fabricated units.

Developed from Coombes (34)

FIGURE 5

The nature of the industry is such that construction firms do not normally have their own industrial premises in the generally accepted sense; this is obviously because the normal requirement of construction work is that of actually working and producing on the site belonging to the client.

However, the construction firm will have certain assets, e.g. head office buildings, plant maintenance depot, construction equipment, etc.

(c) The Role of Design

In considering the significant features of the industry, the inter-relationship between the two functions of design and construction should be included.

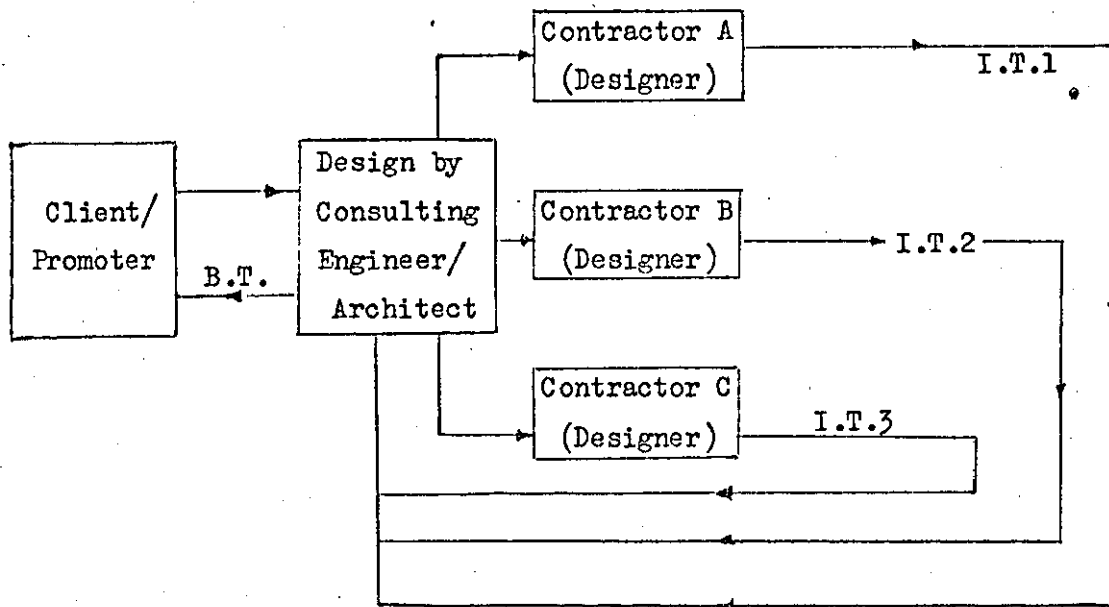
Until quite recently, the contractor has not been involved in making a direct contribution in the design function, although the contractor is sometimes asked how he proposes to carry out a particular contract which may involve him in design. (This approach is almost unknown in traditional building contracts.)

Traditionally the consulting engineer/architect prepares the design so that all the competing tenders are in respect of the same specification; the result is that comparison of the various tenders is reasonably simple. In this situation, therefore, the individual tenders do not have to be studied in detail and evaluated for technical merit; the comparison is essentially one of price.

However, at the present time, the situation is changing: "many contractors now employ their own designers" (115) so that in effect these designers are complementing the consulting engineer/architect employed by the client/promoter in order to evolve the most efficient (and economic) design.

This situation can be shown as follows (Figure 6):-

Inter-relationship between Architect and
Contractors' Designers



I.T.1/2/3

Submission of Individual Tenders

B.T.

Submission of Best Tender

(in terms of efficiency, economics and time factors)

FIGURE 6

Insofar as the submission of individual tenders is concerned, the contractors may decide to submit two separate tenders, one which is based upon the specification of the consulting engineer and a second one which incorporates his own ideas: (the actual incidence of this alternative approach will be considered at a later stage.) As may be imagined, the natural result of this approach could be the practical possibility of a reduction of the traditional separation of the two

functions of design and construction. Whatever the approach, the role of designer is an extremely important one, both in the traditional/technical sense and also in the fact that the calculation of quantities required for the completion of any contract will depend upon his design. (D.E. Warland (119) suggests that the American practice of preparing complete and detailed drawings of all the necessary work, (although mainly for tendering purposes), has much to recommend its adoption in this country.)

An already well-known and widely used alternative to the competitive tender is the negotiated contract, in which, as its name suggests, the client selects the contractor and the terms of the contract are negotiated at a later stage. Advocates of this approach point out that economies result from not having to prepare a tender which may not be accepted and from the better relationship between the client and a contractor whom he has chosen specifically, rather than one who has won a competitive bid. This should result in a better degree of harmony in the interpretation and administration of the contract.

In seeking to find a way to counter the uncertainties associated with construction, certain organisations have established an arrangement in which the client, designer and contractor operate as a single team (92); this is, in effect, a development of the negotiated contract system.

In order to supplement the aforementioned discussion and prior to a consideration of the management framework and processes in industry, it is now deemed appropriate to review briefly the inter-related roles of the architect, the quantity surveyor and the estimator in the construction industry.

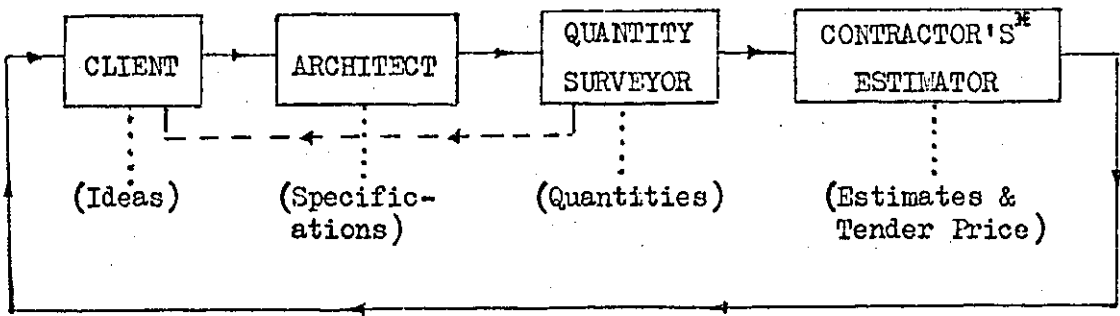
The Roles of Architect, Quantity Surveyor and Estimator

Both the architect and quantity surveyor are either directly or indirectly employed by the client, i.e. they are either employees of the client or alternatively are independent and employed on that basis for the period of the contract by the client. This latter procedure applies because the majority of clients are involved in major projects far less frequently than contractors.

The architect studies the contract ideas of the client and prepares specifications, drawings and instructions accordingly; the quantity surveyor then quantifies these specifications in respect of material (and labour) content.

The estimator, who is employed by the contractor, then receives these quantities from the client and estimates the appropriate prices and rates in order to form the basis of a tender price which will include a profit factor.

The chronological sequence can be illustrated by the following diagram (Figure 7):-



— ← — Preliminary cost prediction which may lead to abandonment of project without recourse to contractor.

^{NE} Usually more than one contractor in competitive situation.

FIGURE 7

The contributions of quantity surveyor and estimator can be indicated by the following formulae:

$$\sum Q \times R = TP$$

Where, Q = Quantities (supplied by Surveyor)

R = Cost of resources (including waste factor)

+ Profit (supplied by Estimator)

TP = Tender Price

(See Appendix 3 for more detailed calculation of profit for tendering purposes)

Section 3

THE MANAGEMENT FRAMEWORK AND PROCESSES IN INDUSTRY

Before considering the management structure of the individual construction company the processes of management will be reviewed. These are detailed in the following diagram which indicates their important inter-relationships (Figure 8):-

Processes of Management and their inter-relationships

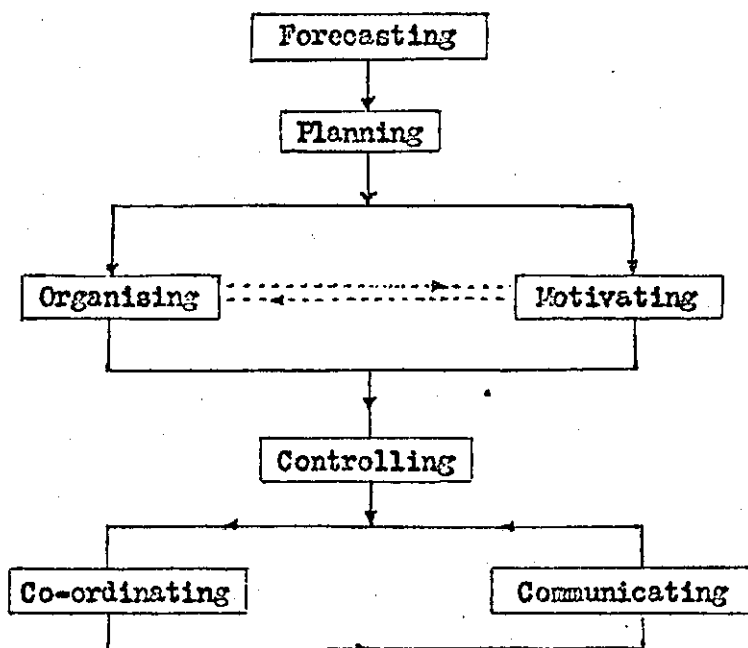


FIGURE 6

The process of forecasting is the one whereby the broad aims and objectives of the organisation are resolved by looking ahead and by attempting to predict the possible future course of events: i.e. a projection of the current situation into the future by the process of extrapolation.

Planning is a process which endeavours to translate the broad aims into a method of reaching that objective, i.e. planning is concerned with deciding future actions on the basis of the available forecasts.

"Both forecasting and planning involve recognition of all the relevant factors in a given situation and understanding of what each factor has contributed to it and how far each is likely to affect the future. But the distinction between a forecast and a budget must be borne in mind; the former is concerned with "probable events", the latter relates to "planned events" and is a statement of the policy to be carried out; budgeting/planning should be preceded by forecasting." (64)

(Alternatively, profit planning and control procedures may be considered under the following main categories:-

- a) the analysis of past performance,
- b) the setting of objectives,
- c) the development of a corporate plan,
- d) the implementation of the plan and
- e) the measurement of actual results (which may lead to a review or revision of the original plan.))

The two processes of organising and motivating may now be collectively considered; the former is concerned with defining the responsibilities of those individuals who are employed in the organisation: it must also stipulate as clearly as possible the relation-

ship of one individual with another. This point is rather important in relation to the second aspect of motivation; lines of responsibility must be clarified. It is not sufficient to lay down objectives and an appropriate organisations: employees must be made to feel involved, they must be given a fair reward in line with their performance and efforts. This may be a financial reward, a promotion or a combination of both.

Then there are the inter-related processes of controlling, co-ordinating and communicating: the first is one which must allow for a feedback of information in order to assist in future planning processes. Complementary to this process of controlling is the process of co-ordinating, a process whereby the structure of the organisation is made to operate smoothly with the flow of information, decisions and results being operative in every direction: too often there is a lack in the "upward" flow, i.e. a lack in the amount of feedback to higher management levels, although it is sometimes argued that such managers do not know what they require for control purposes. Common to the processes of controlling and co-ordinating, there is the process of communicating: in order to be able to control and co-ordinate, there must obviously be effective communication. This must again be in every direction, otherwise the other principles considered previously will tend to be ineffective in practice; good communications are vital in any industrial situation.

Section 4

THE MANAGEMENT STRUCTURE OF THE INDIVIDUAL COMPANY

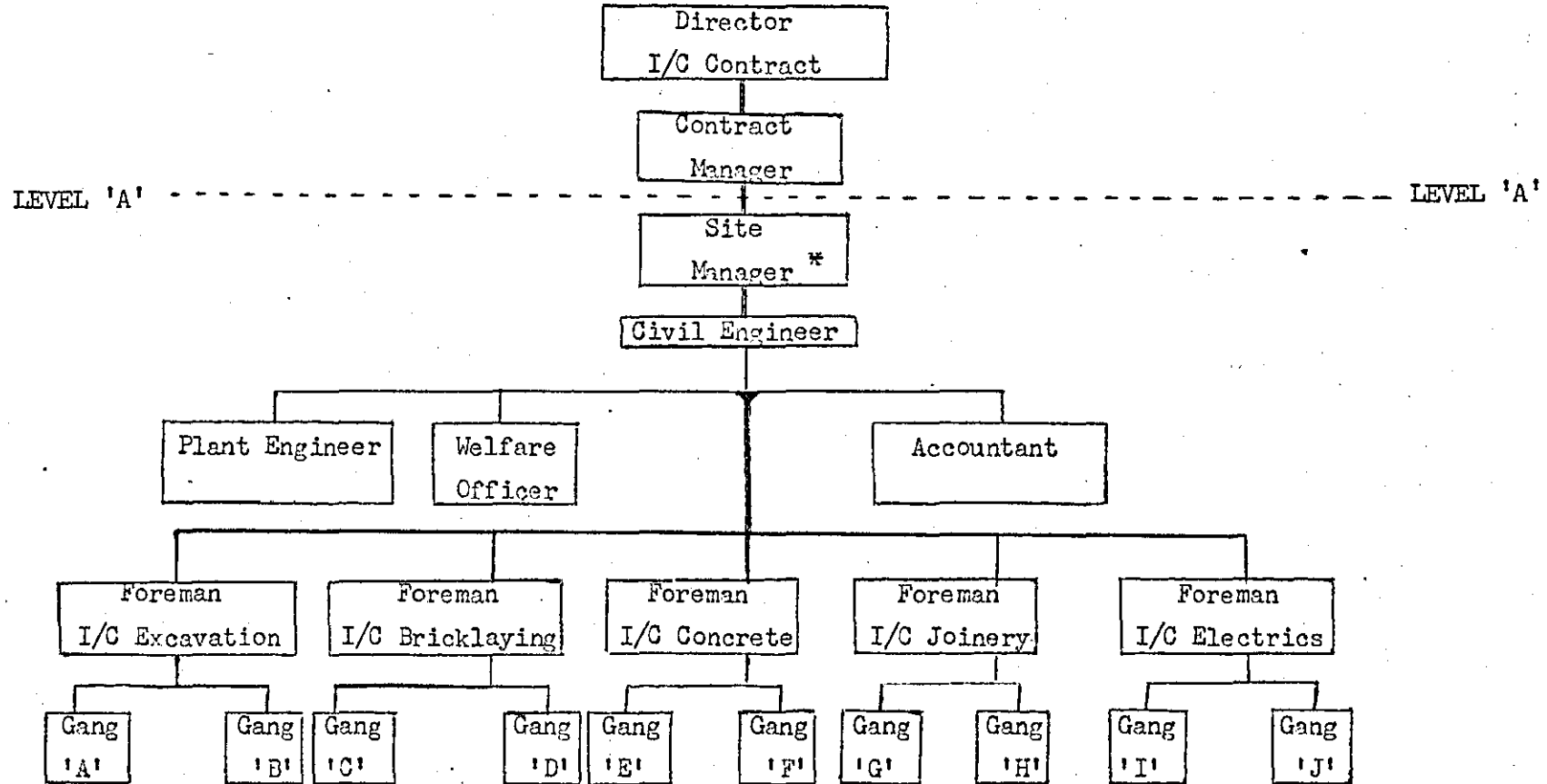
Against the general background of a consideration of the framework and processes of management in industry, it is now proposed

to consider the management structure of a contractor's company. On the following page is an organisation chart which indicates a possible management structure in relation to a particular (e.g. civil engineering) construction project (Figure 9).

Although it may be argued that the site manager is autonomous in regard to any particular site or contract it must not be overlooked that all contracts are influenced by "head office" decisions, i.e. by the actions/decisions of those individuals indicated on the Organisation Chart above Level 'A'. This feature is often thought to be peculiar to the construction industry but, of course, this is not the case as many large industrial organisations have their various factories scattered across the country (even the world) and, therefore, have a similar pattern of organisation. (103)

As may be appreciated, the management structure of the individual company within the industry, tends to be strongly influenced by the engineering science. As indicated on the Organisation Chart, in addition to the civil engineer in charge of a particular site, the general site agent/manager is usually a qualified civil engineer. (see p.21) The resultant disadvantage in such a management framework is that often the manager tends to become too immersed in the technical problems to the detriment of the financial controls and the behavioural aspects of the contracts. (This hypothesis rests upon the supposition that members of such a management structure react in a similar way to managers in other industries.) In particular regard to the latter, the industry is still very dependant upon a co-operative labour force: also in connection with financial controls in the normal capitalistic situation the ultimate measure of the success of a particular contract will be in profit terms rather than in terms of technical efficiency.

Organisation Chart : Construction Project



N.B. It is not to be assumed that all organisations follow the indicated pattern.

* Usually the Site Manager is a qualified Civil Engineer.

FIGURE 9

(This statement is made on the assumption that the minimum safety factors have been fully considered within these financial terms: both the client's and the contractor's safety, quality and technical controls and the terms of the contract normally ensure adequate technical performance.)

Section 5

THE ACCOUNTING NEEDS OF MANAGEMENT IN THE CONSTRUCTION INDUSTRY

General

Within the context of a consideration of the particular accounting needs of management in the construction industry, it is intended to initially deliberate upon some of the comments of R. Pilcher in his book - "Principles of Construction Management" (102) -

"One of the important spheres of control in construction work is that of finance. However, (financial) techniques have not been established in the industry, possibly because of:-

- (a) the temporary nature of construction work on site, and
- (b) the fact that each contract tends to differ from any other.

Any effective cost control system should highlight areas in which losses are occurring or where efficiency obtains." This principle may be illustrated in the following "control loop" (applicable to the construction as well as to other industries (Figure 10):-

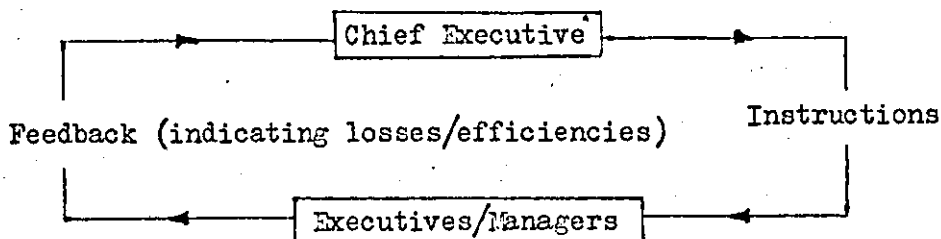


FIGURE 10

As a development of these comments, the following diagram indicates a possible general system of contract control (Figure 11):-

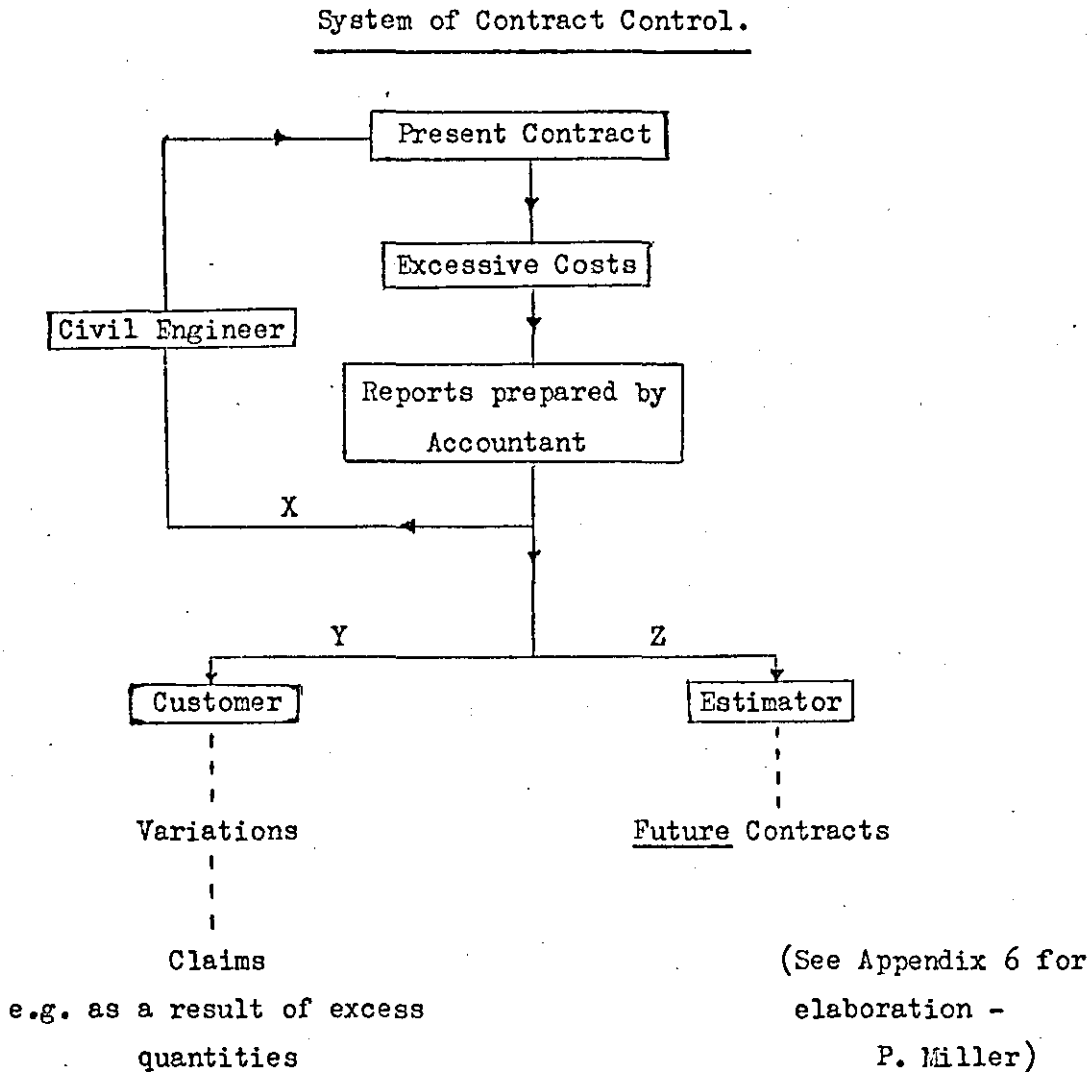


FIGURE 11

In the construction industry the flow of information to the civil engineer (flow line X) and the customer (flow line Y) are generally considered to be important in the efficient control of any particular contract. However, insofar as flow-line Z is concerned, i.e. report submitted to the estimator, this is not always considered

as significant because (as previously indicated) "each contract tends to differ from any other". In fact, "the only time at which the estimator might show some interest in a return of data from a site is likely to be when he is currently pricing similar work for another tender". (102)

When the structure and significant features of the construction industry were being considered (Part II), it was appreciated that the two functions of design and construction are both important. It is a fact that within the accounting needs of management the particular aspect of cost control should apply to both these areas.

The various competitive tenders stem from the original design, although as previously intimated, an alternative design may be submitted by the contractor, therefore, there must be an element of control, so that these various design proposals are within the tenor of the original scheme and also give the individual contracting company an opportunity to gain the contract in the "additional" terms of price, completion date, etc. (In addition to the aforementioned competitive situation it is appreciated that the design function is also involved (i) in the negotiated type of contract and

(ii) when there is no competition.)

Once a particular tender is accepted by the customer, this control element still applies, although it may be necessary to re-vamp the original estimated cost of the scheme in view of changing facts and circumstances. When this process is completed it will then be necessary to contain the actual cost within the 'new' estimate, so that the required profit is attained by the contractor. As in the normal industrial situation, the important aspect of cost control is

a joint responsibility; it is the responsibility of both the engineer and the accountant.

Time and Cost Analysis.

As previously intimated, the accounting needs of management in the construction industry are such that they should be geared not only to the cost (and profit) factor, but also the time factor. It is imperative that not only should a profit result upon the completion of a contract but that the contract is completed on time. In addition to the possible loss of reputation due to a late completion, the client more than likely imposes a damages clause which will ultimately affect the profit on that particular contract.

It is, therefore, important, at an early stage, to inter-relate the cost and time factors in regard to the contract(s) on hand. If a contract is completed earlier than necessary (within the terms of the agreement), this can prove costly to the contractor; conversely, if reduction of cost is allowed to dominate the issue resulting in delay of completion, the contractor has not fulfilled his part of the agreement. Therefore, a "realistic" (required) Time Cost Curve is necessary in order to indicate the inter-play of these two factors in the construction situation; such a curve is illustrated in Figure 12.

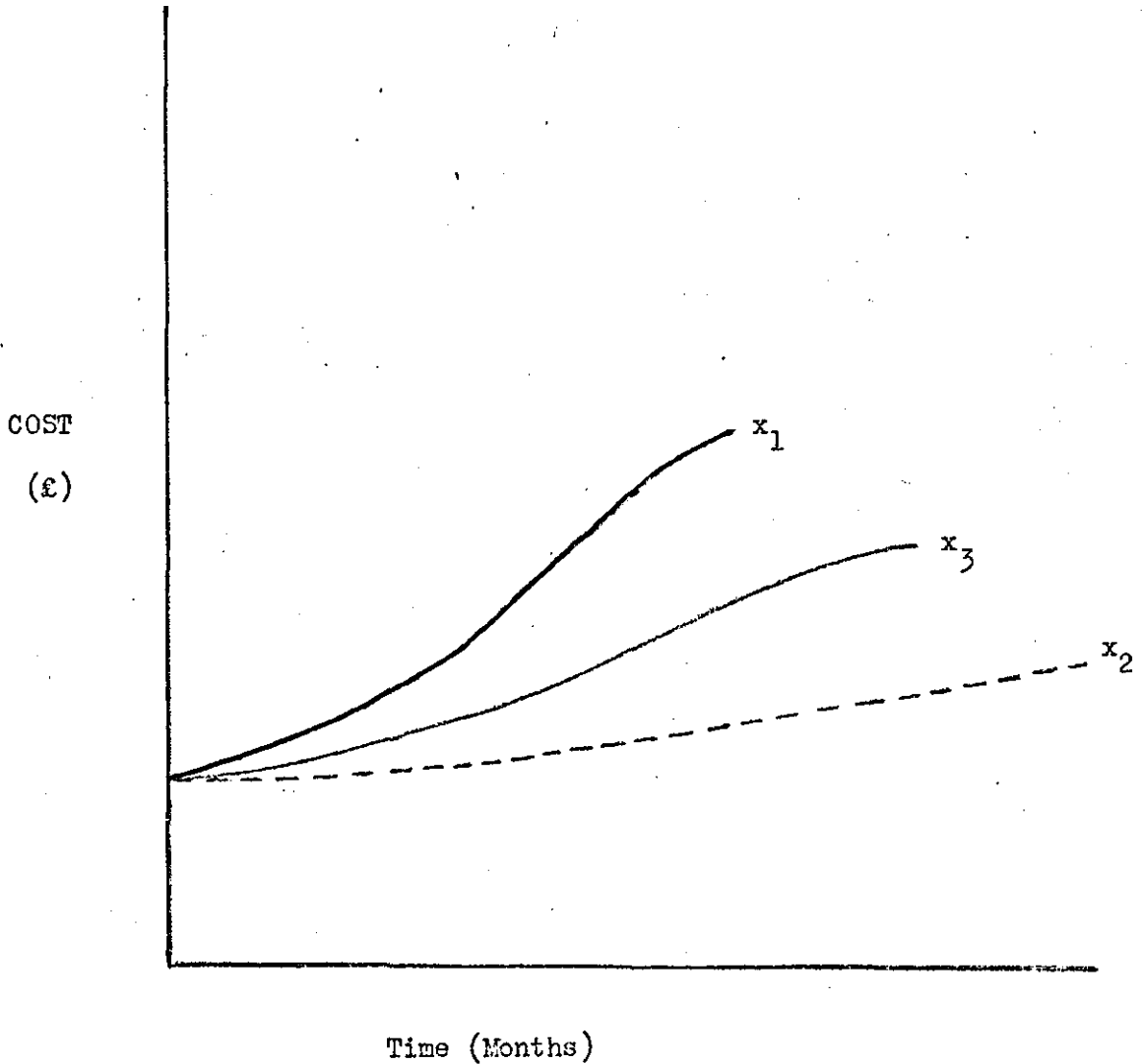
It may be appreciated that the aforementioned factors tend to influence the particular accounting needs of management at various levels in the individual contracting company and these will now briefly be considered.

The Needs of Higher Management

Before considering some of the possible accounting needs of

Time - Cost Curves

Adapted from - "Project Cost Control" - Operational Research Society
and Institute of Cost and Works Accountants (95)



x_1 = Increased Resources = Shorter time but Higher costs

x_2 = Reduced Resources = Lower costs but Longer time ^{*}

x_3 = "Realistic" Time Cost Curve

* (This diagram simplifies a complex situation: viz because of fixed overhead expenses, longer time does not necessarily lead to lower costs).

FIGURE 12

"higher" management, it is essential to define the nature of such management for the purposes of this thesis; it is, therefore, suggested that the Director i/c Contract and the Contract Manager should be classified as being within this category. (Organisation chart - Figure 9)

The accounting reports to higher management in the construction industry (as in other industries) should be comprehensive, i.e. higher management should not be involved in detailed information: some summarised information should be forthcoming in respect of the majority of contracts on hand at the particular point in time. This accounting information should give an indication as to the progress of these contracts in terms of both costs and time. However, selectivity can prove to be very useful in that "the vital few facts should be separated from the trivial many"; in other words, it is essential to highlight and pinpoint the most significant information. High-level managers are busy (and expensive) people and their time should not be wasted on relatively unimportant matters.

These contract reports will not normally be prepared as frequently for higher management as for the individual site managers, e.g. a comprehensive report on various contracts for which he is responsible may be submitted to the contract manager, say bi-monthly, and an individual site report to the site manager, say monthly. These reports may take the form of diagrams or written and tabulated reports; either way, the need is to give some indication of existing trouble spots and also to draw attention to satisfactory areas from which resources may be safely withdrawn and applied to the more difficult contracts.

(It must be noted, however, that even within the sphere of "higher" management, the type and timing of the accounting reports may differ, e.g. information may be given to the Director at even less frequent intervals than to the Contract Manager.)

The Needs of Lower Levels of Management

As inferred in the previous sub-section with reference to the needs of higher management in the construction industry, it is suggested that the lower levels of management include:-

- (a) the site agent/manager,
- (b) the civil engineer (on site),
- (c) the plant engineer,
- (d) the welfare officer, and,
- (e) the various functional foremen.

The essential principle to be considered in regard to their accounting needs is that the information forthcoming from the accounting system is in line with their particular areas of responsibility, i.e. there is in effect a system of "responsibility accounting".

To a greater or lesser extent all these managers need to know:-

- (i) the resources at their disposal,
- (ii) the present (v. estimated) rate of usage, and,
- (iii) the measure of the efficiency of usage.

(For simplicity it could be argued that (i) and (ii) are purely financial/quantitative considerations and (iii) is of a technical nature, but obviously there is a significant degree of interaction between them.)

However, insofar as the site manager is concerned, his responsibility is a wide one and covers all the areas of activity on the site. Therefore, on a fairly regular basis, say weekly, he wants

an indication of the extent to which the various elements of costs have been efficiently controlled, e.g. materials, labour, plant and equipment. As a natural projection of this information he usually requires a comparison between the money spent in respect of the site and the value of the work completed: this "profit" representation may be shown in the form of a chart (Figure 13).

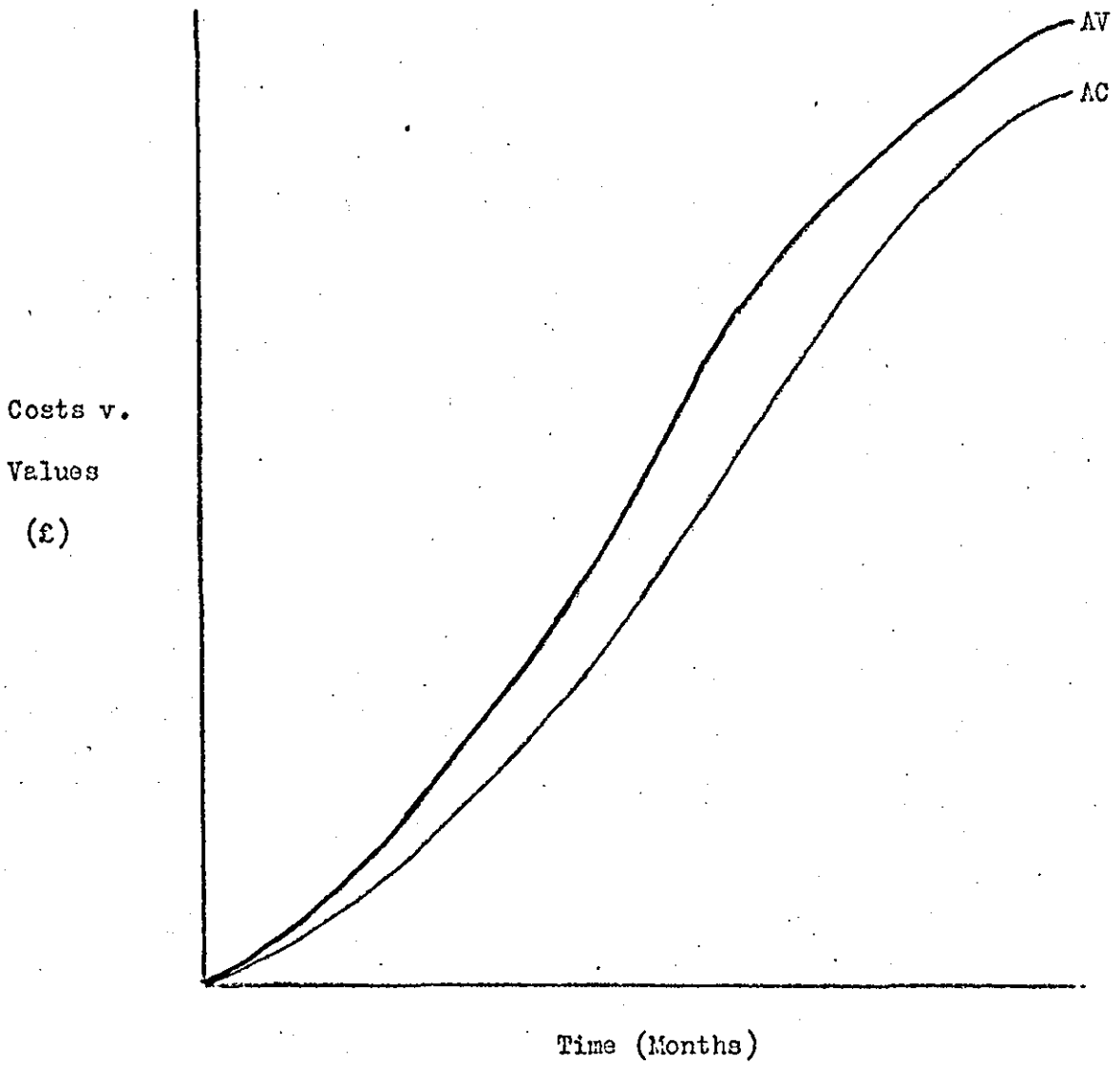
Also a similar comparison on the same (or on a complementary) chart between the estimated costs and estimated values often proves useful: management will tend to pay more attention when actual profit is less than anticipated profit.

In addition to the various items already mentioned, the site manager will also need to know the actual progress of the contract, i.e. the actual physical work completed at a point in time as compared with the programme: although it could be argued that this is already reflected in the value of work completed. (A simple Gantt Chart can be used to advantage in this application).

(It should be noted that the site manager is also concerned with the technical attainment of the contract but the question of assessing the quality of performance is obviously outside the scope of this thesis.)

To consider another aspect of the accounting needs of lower levels of management, the needs of the foreman should be included. His area of responsibility is more narrow than that of the site manager, e.g. foreman i/o excavation or foreman i/o joinery. The foreman, together with the site manager, is concerned with costs and progress but only insofar as they affect his (more limited) area of responsibility. It may be that he is particularly affected by the casual labour factor in the construction industry and, therefore, needs detailed labour costs

Contract Profit - Graphical Presentation



A.V. = Value of Work

A.C. = Cost of Work

(A.V. Minus A.C. = Profit)

FIGURE 13

on a regular basis (say weekly). Manpower-mix may also be an important consideration so that there must be a constant check as to the actual grade of manpower in use as compared with the "standard" originally agreed upon as a basis for the tender.

At this level of cost analysis there are some inherent difficulties associated with the construction industry; "unfortunately, the Bill of Quantities prepared in the traditional form (i.e. in accordance with the Standard Method of Measurement - see Appendix 2) bears no direct relationship to the organisation of activities comprising the contract" (95); the Bill of Quantities is a narration of activities. Therefore, there is insufficient basic control data for lower levels of management. It has been suggested that the construction industry needs to re-orientate its thinking in regard to detailed cost analysis but this is outside the scope of this study. However, there would seem to be opportunity for more exactness as to the cost of the constituent operations and processes than seems to be the case at the present time. (see Part V - Section 2 - Operational Bills)

As P.L. Clood (32) has suggested - "management information may be defined as information which is made available in such a form and at such a time that it may enable better decisions to be taken". It is agreed that promptness in presentation is important and that the form of presentation is equally important but does not the supervisory management of the construction industry need accounting information more clearly orientated to their area(s) of responsibility? (Some indication as to whether this is so or not, together with the specific needs of different levels of management, will be discussed as a result of the research questionnaire circulated to managers, foremen and

accountants employed by the industry (Part IV - Section 4).

Insofar as a greater degree of cost analysis may be required, together with speedier presentation of such information, fuller utilization of the computer will no doubt make a vital contribution towards meeting this management specification.

Having considered the structure and significant features of the industry together with an appraisal of the possible accounting needs of management, the various techniques associated with management accountancy will now be studied as a means of establishing an indication of the extent to which these techniques may fulfil the accounting information needs of management in the construction industry.

PART III

TECHNIQUES ASSOCIATED WITH

MANAGEMENT ACCOUNTANCY

PART III

TECHNIQUES ASSOCIATED WITH MANAGEMENT ACCOUNTANCY

Section 1

INTRODUCTION

In the earlier parts of the thesis the construction industry has been discussed; against the background of both the structure of the industry and the management processes in industry, the accounting needs of management were considered. It is suggested that the construction industry, together with other industries, may find these needs satisfied by the realistic application of management accounting techniques, and it is, therefore, proposed to consider some of them.

However, it would not be correct to equate management accountancy with a set of techniques; "management accountancy is concerned with the purpose of accounting rather than with techniques" (112). This view has been emphasized by various authorities in the sphere of accounting, e.g. it has been stated that "the accounting system is the major quantitative information system in almost every organisation. An effective accounting system provides information for three broad purposes:-

- (1) internal reporting to managers, for use in planning and controlling current operations;
- (2) internal reporting to managers, for use in making special decisions and in formulating long-range plans; and,
- (3) external reporting to stock-holders, government and other outside bodies" (57).

In order to provide the information (1) & (2) to assist management at all levels, the Management Accountant should employ those

techniques which aid management in their planning, control and decision-making roles; he should, where appropriate, direct the attention of management to inefficiencies and/or quantify the relative merits of possible courses of action in order to facilitate the solution of problems.

At this point in the development of the thesis, their relevancy to the construction industry will not be specifically considered, although it can be stated that there is a growing awareness of the usefulness of management accountancy techniques and enlightened opinion suggests that all the various techniques associated with management accountancy could be employed. (see Part IV)

It is, therefore, proposed to limit this study to the techniques at present used in other industries; at a later stage (Part IV) the extent to which these techniques are being used, improved and extended in the construction industry will be considered. (To suggest specific areas in which some of the management accounting techniques might be possibly applied and extensively developed could be the subject of further research and is considered to be a natural extension of the preultimate part (V) of this particular thesis; the final part (VI) indicates the responsibilities of the construction industry itself, the universities and the technical institutions and the various professions, in regard to this development.)

Section 2

THE NATURE OF MANAGEMENT ACCOUNTANCY

Over the past fifteen to twenty years much has been said and written concerning management accountancy. Perhaps the present period of time, when the stress is upon "productivity" and "productivity

agreements" is an appropriate time to examine this subject which can be a valuable aid towards the improvement of productivity and the level of general management, both vital issues to all facets of British industry, including the construction industry.

But what exactly is "management accountancy"? Since the Management Accountancy Report of the Anglo-American Council on Productivity in 1951 (2), many varied definitions have been used. One is that of R.G. Bassett: "Management Accountancy is all those accounting activities which assist management at all levels and generally improve the daily running of the business" (7).

What is really meant by this and many other kindred definitions? Upon close consideration it would seem that management accountancy introduces nothing new, although it has been referred to as a "modern" tool for management. The difference seems to be in the attitude and approach of management and the accountant as to the latter's function within the organisation. As D.A.J. Manser has stated: "A management accountant can provide a service to top management interested in earning a satisfactory profit by co-ordinating the efforts of all functions in:-

- (a) acceptance of the accounting profession into the management team,
- (b) profit engineering,
- (c) budgetary control,
- (d) standard costing,
- (e) the management of finance,
- (f) the reduction of wasteful practices, and,
- (g) specific ad hoc assignments." (78)

Natural evolution and development applies to industry and commerce as well as to other spheres of life and a positive approach in

the field of accountancy is certainly something to be encouraged; there must be a growth in accounting and accountability, complementary to the growth in technology. The industrial (and practising) accountant must endeavour to introduce and maintain a service within the individual organisation and industry as a whole, which is of real benefit to management.

Good communications are essential in industry and, therefore, the management accountant must do his part not only in presenting the necessary information, but also in interpreting the facts and figures to the best of his ability: he should be more of a financial analyst and adviser than an accountant in the purely conventional sense. It is generally appreciated that if any information is to be useful, it must be fully understood by management; yet at the same time, it is the responsibility of the accountant to educate the recipient in the phraseology and technical jargon used in the field of management accountancy.

Section 3

TECHNIQUES ASSOCIATED WITH MANAGEMENT ACCOUNTANCY

A study of some of the techniques associated with management accountancy follows; the list detailed below is not intended to be in any way exhaustive, in view of the state of development in the sphere of general management techniques. For the purposes of this thesis, however, the list indicates the extent of the research appraisal undertaken in relation to the techniques of management accountancy and the construction industry (Part IV). It has already been stated that the accountant's task of supplying information has various facets, i.e. in the areas of score-keeping, attention directing and problem solving. However, these distinctions tend to overlap in a particular management

accountancy task and similarly the various techniques must not be seen in isolation: as they are considered it will become apparent that there is an inter-relationship between them, e.g. between long-term forecasting/planning and budgetary control.

The well-known techniques are:-

- (1) Internal Audit,
- (2) Marginal Costing,
- (3) Break-even Analysis,
- (4) Long-term Forecasting and Planning,
- (5) Budgetary Control,
- (6) Standard Costing,
- (7) Capital Expenditure Project Assessment,
- (8) Internal Ratio Analysis, and
- (9) Interfirm Comparison (incl. Uniform Costing).

These techniques are not listed in any significant order, but set against the background of earlier deliberations it is suggested that internal audit (1) is concerned with a comprehensive and systematic review of all operations and records, whilst marginal costing and breakeven analysis (2 & 3) are useful in the problem-solving area. Long-term forecasting/planning, budgetary control, standard costing and capital expenditure project assessment (4, 5, 6 & 7) are related to planning and controlling, together with internal ratio analysis (8); the latter forms a foundation for the last technique to be considered, namely, inter-firm comparison (9). Each of these techniques will now be briefly considered.

(1) Internal Audit

This particular type of audit is organised within the individual firm and may relate to financial, cost and other forms of record. In certain cases, definite steps may have been taken to

integrate the internal audit with the work of the statutory auditor.

Internal audit is a systematic review of operations and records, and must not be confused with internal check, which exists where the work of one employee is proved independently by, or is complementary to, the work of another. (It is quite possible that some of internal check evolves naturally over a period of time in the majority of cases). The chief aims of internal audit are to increase accuracy, detect errors of accounting principles, and speedily detect and thereby prevent fraud. The internal auditor may also verify the assets and liabilities of the concern and may focus his attention on special investigations should the need arise.

(In many organisations, Internal Auditors also deal with Organisation and Methods, because of their overall knowledge of the systems in use. Indeed, O. and M. work often is the major occupation of the so-called "Internal Auditors".)

It would seem that although the technique of internal audit could be useful in all sizes of firms, it may be more beneficial in the larger type where control may be rather more difficult. The smaller unit may feel no such justification because of the immediate "physical" control which is possible; nevertheless, occasional "spot checks" by the firm's accountant could well be applied in order to discourage fraud, even in those circumstances.

Whilst the technique of internal audit tends to increase efficiencies/decrease inefficiencies in a firm, staff who directly or indirectly become the object of such a review initiated by management, may be resentful because they interpret the audit as a lack of confidence in their capabilities.

(2) Marginal Costing

This is a technique which is designed to facilitate more

effective cost control; the technique differentiates between marginal costs and fixed costs. Marginal costs (or "out-of-pocket"/variable costs) occur in connection with production and, therefore, tend to vary directly with any variations in production; however, fixed (or "period") costs tend to remain static, irrespective of production levels.

The basic approach is to calculate the "contribution" of each product/product-group towards these fixed costs and ultimately towards the overall profit of the company, e.g.

	£'000			
	Product A	Product B	Product C	Total
Sales Revenue	500	500	500	1500
less Marginal costs	300	250	200	750
<u>CONTRIBUTION</u>	200	250	300	750
		less Fixed Costs		<u>250</u>
		NET PROFIT		<u>£ 500</u>

By presenting information in this alternative "marginal" form, it may be possible to more clearly indicate to management, correct forms of action in various sets of circumstances.

It is contended that the technique of marginal costing can specifically contribute towards making better decisions regarding the sales effort of a company, i.e. it is possible to calculate the relative contributions in relation to Sales Revenue. Using the previous example:-

Contribution : £1 Sales Revenue

		£
Product	A	40p
Product	B	50p
Product	C	60p

Therefore, assuming no other influential factors, the sales force would be asked to concentrate any extension of their sales effort on Product C, as this product gives the best contribution towards the fixed costs for every extra £1 of sales revenue.

Conversely, marginal costing is considered to be useful when a business is endeavouring to attract custom during a short-term period of trade recession, the argument being that any sales revenue which is in excess of the marginal cost of a particular order makes a contribution towards the fixed costs of running the business: this would obviously not be the case had such an order not been accepted. However, this particular application must not be allowed to affect long-term pricing-policy considerations, which must be designed to ensure overall profitability over the whole range of operations: it can, therefore, be appreciated why this particular technique has been likened to a very sharp instrument which must be handled with extreme care. In addition to the aforesaid reservation, the critics of marginal costing also stress the practical difficulties associated with the analysis of cost into the two categories of fixed and marginal (see further comment - Break-Even Analysis (3))

(3) Break-Even Analysis

This technique is one which is derived from the preparation and interpretation of either a "break-even" chart or/and a "profit chart". Both these charts show the profit or loss at various levels of activity, the level at which neither profit nor loss is shown being termed the break-even point. The relationship of total cost of Sales to Sales Revenue is plotted on the conventional break-even chart (Figure 14) whereas on the "profit chart" is plotted the relationship of fixed costs to contribution (Figure 15).

Conventional Break-Even Chart

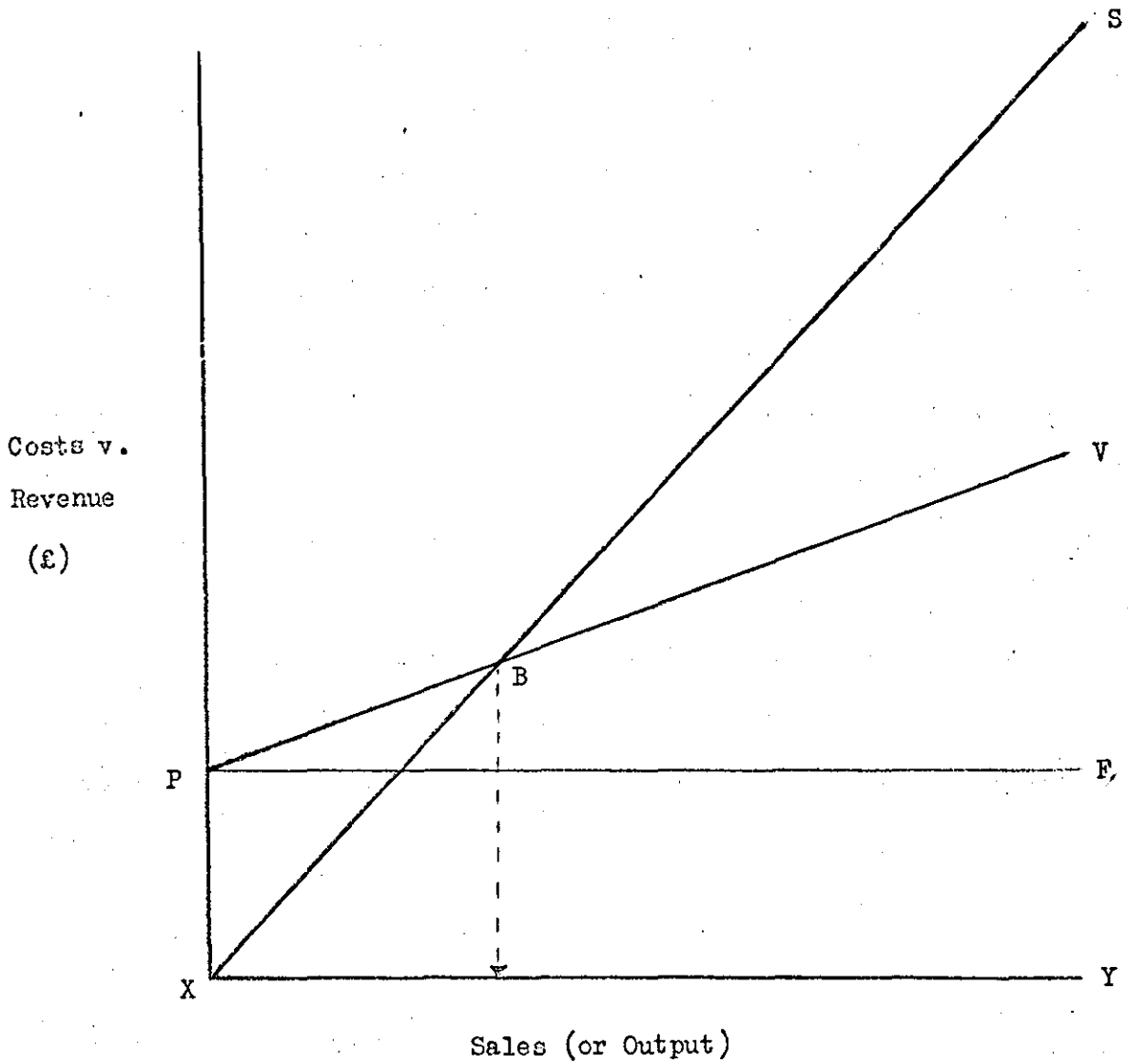
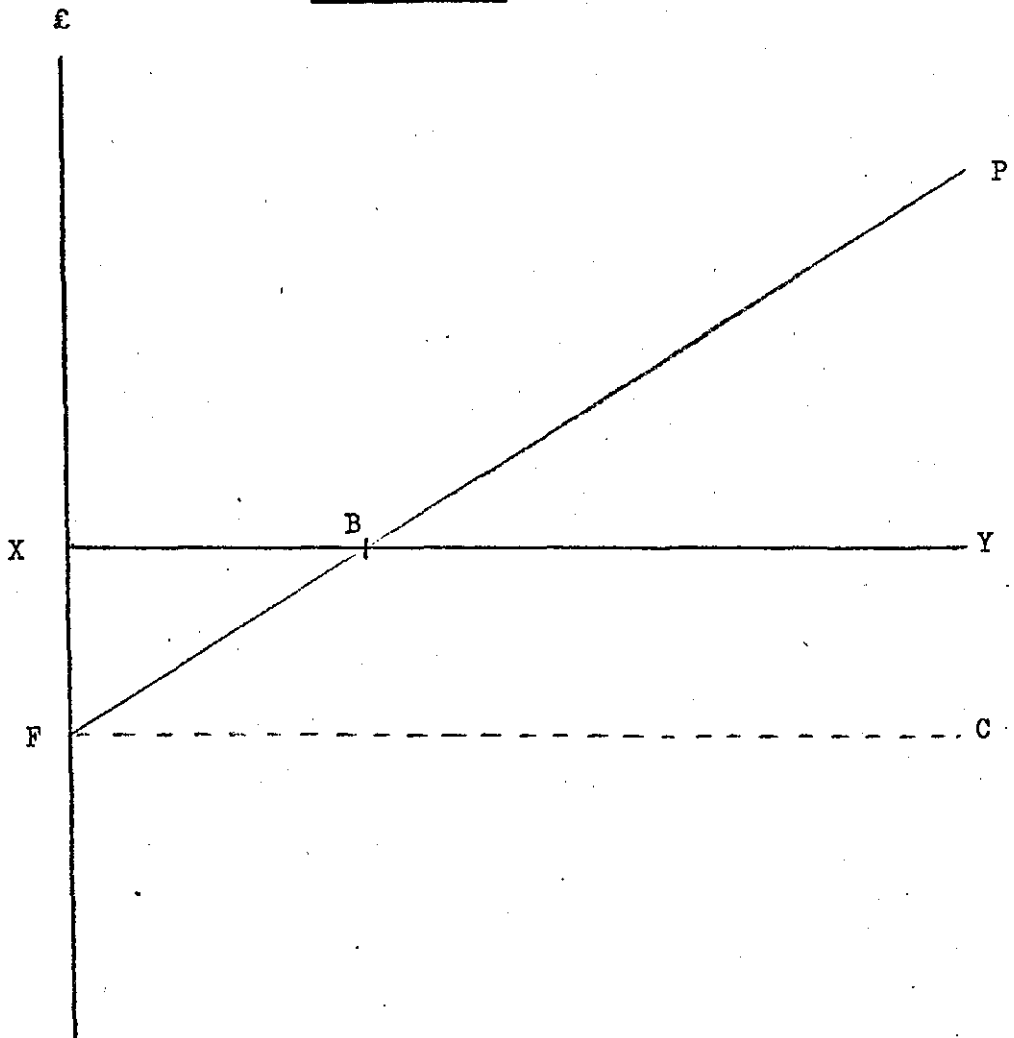


FIGURE 14

Profit Chart



XF = Fixed Costs (= Total Loss)

PY = Total Profit

FC = Total Contribution (= XF + PY)

FBP = Contribution Line

XY = Sales or Output Axis

B = Break-Even Point

BXF = Loss Area

PBY = Profit Area

FC = Contribution Area

FIGURE 15

Break-Even Formula

Alternatively, the break-even point may be calculated by the following formula:-

$$\text{Break-Even Point (\%)} = \frac{F}{C} \times 100\%$$

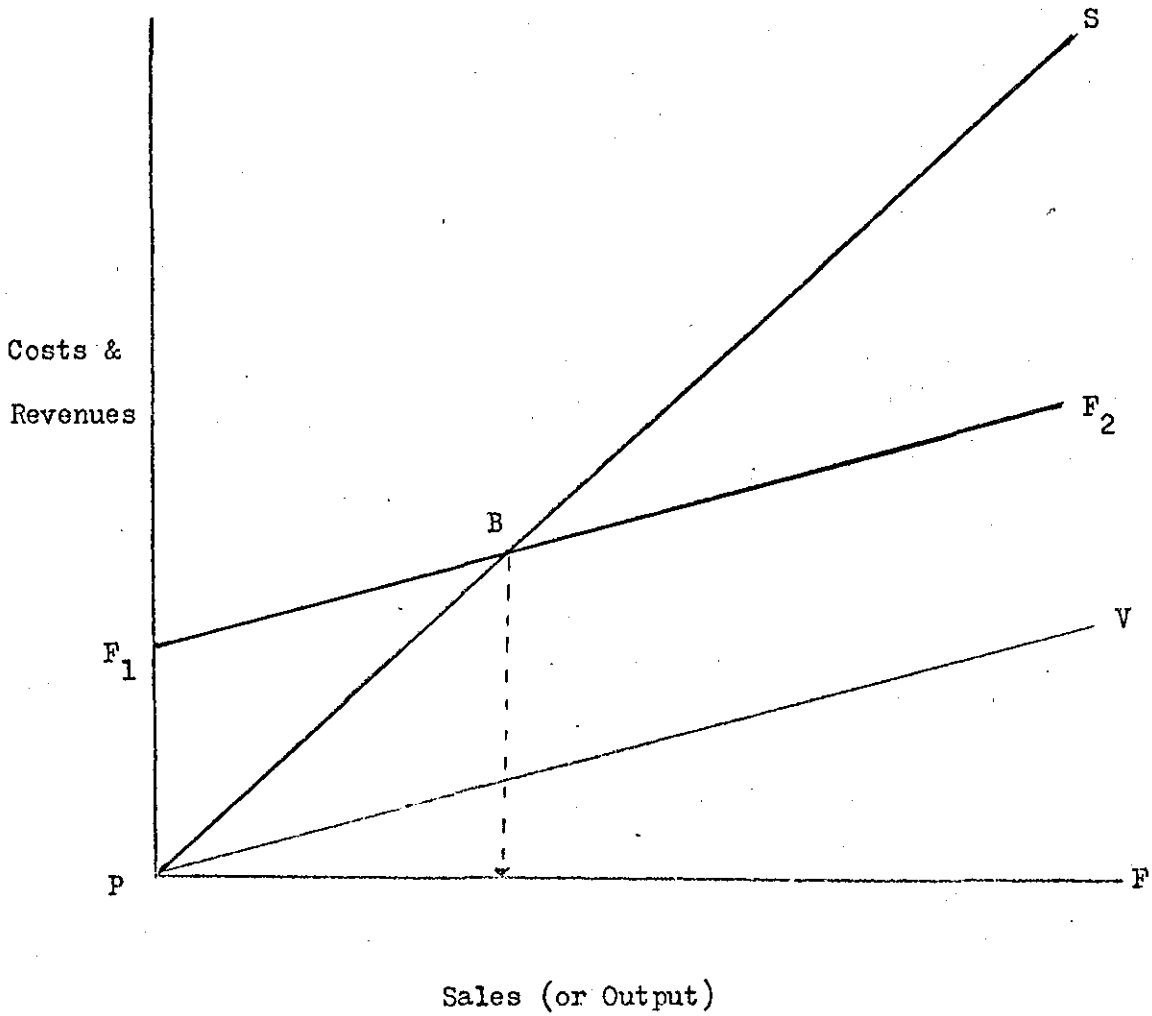
where F = Total Fixed Costs in relation to the actual (or anticipated) level of sales turnover.

C = Total Contribution in relation to the actual (or anticipated) level of sales turnover. (i.e. Total Selling Value minus Total Marginal/Variable Costs)

The use of such charts tends to lend itself to the consideration of a period's trading in respect of a one-product firm, although various combinations of multi-product sales can be considered in order to assess the optimum level of activity. (A study of this more analytical approach, via the so-called "hip-roof" chart, is considered to be inappropriate to this limited appraisal and has, therefore, only been mentioned should further reference be required.) (23 & 43)

An alternative presentation of the conventional break-even chart may help in the analysis of a particular situation: this alternative clearly shows that until fixed costs are recovered by sales revenue, a loss will result. Also by this particular presentation, the contribution factor (i.e. sales revenue minus marginal costs) is shown (as in the profit chart). This form of presentation (Figure 16) is, therefore, utilized in order to indicate that below the break-even point, it is the fixed costs which are not being recovered in the sales: to stress this important point, the fixed costs are placed above instead of below the variable items.

Alternative Presentation of Break-Even Chart



VPF = Variable (Marginal) Costs

$F_2 F_1 P$ = Fixed Costs

SP = Sales Revenue

$F_1 F_2$ = Total Costs Line

B = Break-Even Point

$BF_1 P$ = Loss Area (in terms of fixed costs)

SBF_2 = Profit Area

SPV = Contribution Area

FIGURE 16

In addition the profit chart can be analysed to indicate the effect of the relationship between fixed costs and variable (marginal) costs, and the fact that although total costs and sales can be the same in two situations, the break-even points are different (Figure 17).

In the case of Situation B, although the same total costs are incurred as in Situation A, the higher incidence of fixed costs means that more sales revenue is required to create a comparable break-even point. (A higher degree of mechanization is obviously one factor which increases the amount of fixed costs.) It will, therefore, be appreciated that where trade is uncertain and recession is more likely, a firm in Situation A will be in a better position; a firm in Situation B is a particularly vulnerable one in regard to fluctuations in demand. (Within the context of this application, it could be argued that the financial strength of a firm can be expressed in relation to its margin of safety, i.e. the volume of sales which is in excess of the break-even point.)

Conversely, i.e. when there exists a period of sales expansion, the firm in Situation B will tend to make profits at a faster rate in the comparative situation, due to the fact that fixed costs have already been recouped and in this second situation the Profit/Volume (i.e. Contribution/Selling Value) Ratio is higher (indicated by steeper angle of incidence (Figure 17), i.e. $P_B V_B$ is steeper than $P_A V_A$).

From this resumé it is clear that many practical situations can be presented and thereby analysed and interpreted by the use of the various types of break-even charts. However, certain reservations must be considered: the most significant is the division of costs into fixed and variable which may prove difficult in practice. Also, the "linear" presentation of these charts is sometimes criticized as being

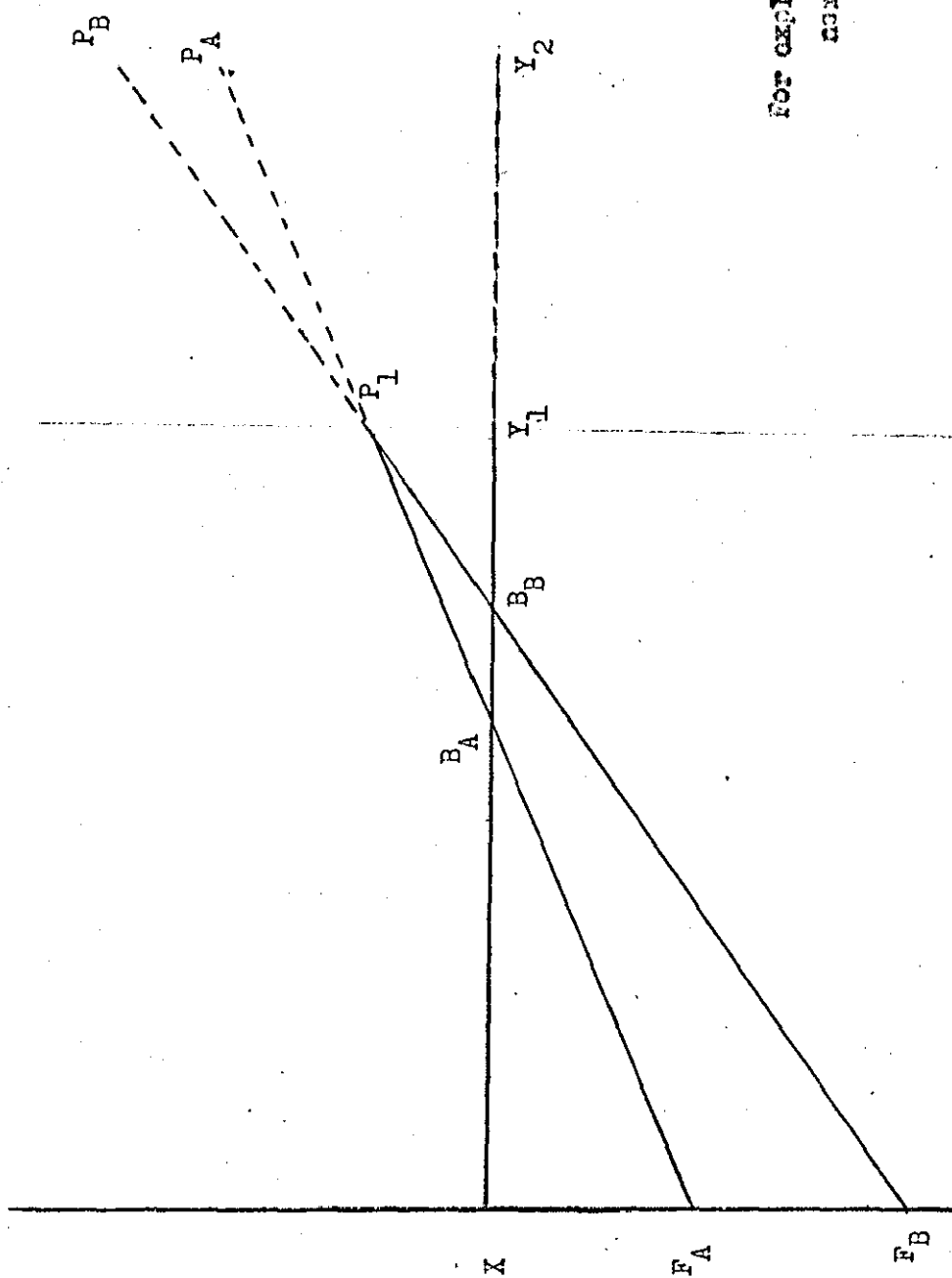


FIGURE 17

Explanation of Comparative Profit Chart (FIGURE 17)

XF_A = Fixed Costs in Situation A

XF_B = " " " " B

P_1Y_1 = Profit in both Situations

B_A = Break-Even Point in Situation A

B_B = " " " " B

$Y_1 - Y_2$ = Extension of Sales (or Output)

$P_A Y_2$ = Profit in Situation A - after extension of sales/output

$P_B Y_2$ = " " " B - " "

an inaccurate reflection of both cost incidence and sales revenue.

This point has been refuted to a certain extent by research, with the result that it has been confirmed that "cost and volume relationships are usually linear within the range of probable activity levels" (58).

It is contended that this technique is at least a useful guide to management, particularly when used in conjunction with other management and accounting aids.

(4) Long-Term Forecasting and Planning

The technique of long-term forecasting and planning reached nation-wide significance in September 1965 when the National Economic Development Council issued the "National Plan". Although in essence the principle behind its publication (i.e. the importance of national economic growth) was a good one, by July 1966 the Plan had fallen into disrepute because it proved to be unrealistic. This fundamental limitation of the National Plan highlighted the fact that realism together with conservatism should be applied in any exercise in this category.

Nevertheless, alert management should relate the policies of the individual firm to national economic trends: one way in which this may be attempted is by the use of business forecasting. This is the process of finding out if expansion is possible by examining the general business prospects and in particular, those of the industry of which the company is a part; it is an attempt to assess probable events. Against the background of this business forecasting, the individual company may then prepare long-term plans, by using the results of the general business forecasting to fix the objectives of the company (and determine how they may be achieved). This long-term forecasting/planning may be attempted without reference to formal business

forecasting but is certainly more likely to be realistic (and, therefore, accurate) if such business forecasting is used as a basis.

It is suggested that the degree of accuracy, within the concept of long-term forecasting/planning, can be increased by the application of, e.g. probability theory (see Appendix 7). Notwithstanding this refinement, the technique of long-term forecasting and planning is not the easiest one to apply because many factors change (and will continue to change) the business environment. However, it could be argued that the radical transformation in the business environment that has taken place in recent years necessitates formalized long-range planning, e.g. it has been stated that "the upsurge of interest in strategic planning stems primarily from - the accelerating pace of technological change, changing end-use markets, intensified domestic and international competition allied to change in competitive structures, the growing scale and complexity of business, the need for longer lead times, the changing nature of labour cost from variable to fixed and the shortage of skilled personnel" (112). (In view of the fact that the financial evaluation of long-term plans is difficult, it is, therefore, important that the limits of accuracy are indicated.)

Similarly, D.W. Ewing in his introduction to the subject (42) states that long-range planning is both the cause and a result of some of the great forces that are transforming business, i.e.

- (i) long-range planning is closely connected with the concept of corporation as a long-living institution,
- (ii) planning symbolizes the purposefulness of modern management,
- (iii) planning is connected with the concept of the corporation as an agent of change,
- (iv) long-range planning owes part of its rise to increasing research and development,

- (v) planning represents the "intellectual movement" in management,
- (vi) long-range planning reflects the strategic approach to organisational behaviour, and,
- (vii) long-range planning is evidence of confidence in the economic and political stability of our society.

Normally long-term forecasting and planning relates to a period 2 - 5 years ahead, whereas budgetary control (which is to be considered later) is usually concerned with the plans for the immediate 12 month period ahead.

The main function of this (former) technique is to minimize the unknown factors which operate in industry: a study of long-term trends will enable the company to deploy its resources in ample time. At the present time, this facet of long-term forecasting is particularly significant in the sphere of capital-raising as it is very important to recognize the need for further capital at the right time, i.e. well in advance of requirement; it is lacking in business expertise to wait until the situation is desperate. However, in using this technique it should be appreciated that whilst it is not always a very precisely reliable guide, it should nevertheless be sufficiently accurate to help management in the establishment of long-term policies.

Separate forecasts (and ultimately plans) will generally be made in respect of:-

- (i) Sales (related to work-ahead/order book position),
- (ii) Production (including personnel requirements),
- (iii) Trading Results,
- (iv) The Cash Position, and
- (v) Capital Expenditure.

These forecasts and plans will be allied to the required (i.e. internal) rate of growth, which in turn will reflect the policy of the business, bearing in mind -

- (a) the anticipated national annual growth rate,
- (b) the growth of the industry of which the individual company is part, and
- (c) the growth of any related industries, which would affect the demand for its own products.

Budgetary control is related to long-term forecasting and planning because some time prior to the financial year-end, the broad outline of the following year's plan is analysed into more detailed budgets, revised according to the present year's trend. All remaining plans will also be revised accordingly and trends projected for the completion of a further year's forecast/plan, so maintaining the system of forecasting and planning for 2 - 5 years ahead.

Although the aforementioned practical difficulties must not be ignored, it would seem reasonable to suggest that forward-looking management should attempt to utilize long-term forecasting/planning and may, as a result, expect some guidance in its decision making. It is believed that this technique is of growing importance, especially with the trend towards larger industrial units (with the evolution of corporate planning) and the resultant increased risk factor particularly inherent in the horizontal type of merger.

(5) Budgetary Control

The technique of budgetary control is essentially a management technique, rather than one of accounting. This can be more fully appreciated if the definition of the Institute of Cost and Works Accountants is considered; this states that "budgetary control is the

establishment of budgets, relating the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy, or to provide a basis for its revision". (63) As can be perceived, this definition endeavours to differentiate between a system of budgets and this particular technique, which incorporates the important function of control. Together with the often-associated technique of standard costing, budgetary control applies the principle of 'management by exception', i.e. management at all levels tends to concentrate on those items ("exceptions") which are out of alignment with the budget (or standard).

Further to the discussion about long-term forecasting and planning, the aspect of realism must not be overlooked. If the budgets are to be accepted by management, it is fairly obvious that they must reflect as accurately as possible a viable situation: yet it is sometimes argued by higher management that an element of challenge (e.g. in terms of cost reduction) should be incorporated into the budgets whilst they are actually being prepared. (53) However, should this approach be adopted it will necessitate an adjustment in the final company budget in order to allow for the possible non-attainment of the various budgets. This complication does not arise when each budget is agreed by the manager whose area of responsibility is indicated in the budget and incorporated into the overall scheme of budgets. It has been correctly stated that "the supreme importance of the human aspects of budgeting cannot be overemphasized. Too often, top management and its accountants are over-concerned with the mechanics of budgets. The effectiveness of any budgeting system depends directly on whether the managers it affects understand it and accept it." (58)

A contribution to this "realism" factor is a full appreciation of any limiting factors which may affect the budgets; these limiting factors are internal or external constraints on production or distribution functions, e.g. lack of orders, financial difficulties, lack of skilled labour.

(Where various levels of production apply, the associated technique of flexible budgeting should be used in order to make a more realistic assessment of the differing situations - see Appendix 8)

The scheme of budgets, within the framework of this technique of budgetary control, usually covers a period of 12 months and evolves from an assessment of sales for that particular period of time. (Cash budgets usually have to be up-dated more frequently than every 12 months; cash flow is important in times of high interest rates and closer control and monitoring is usually called for than that possible on an annual budget.) Such a budget (amongst and related to other budgets) could be interpreted as a kind of business model, or alternatively as a blueprint/engineering drawing. Either way, the idea of such a budget is considered to be good psychology, bearing in mind the previous deliberations on realism in budgeting. This would seem to be a reasonable supposition, realising that industry consists of individual managers, each needing an aim or target in both their industrial and private lives.

The budget itself should help to define an area of responsibility and this in itself had much to commend it. Finally, the involvement of the various functional and departmental managers in the preparation of the integrated and comprehensive system of budgets should help to create a certain esprit de corps, a factor which is very often missing in industry; this should not necessarily conflict with the necessity of engendering healthy departmental competition within the organisation.

In recent years, the technique of budgetary control has been related not only to the planned policies of the organisation - and reflected within each function - but also to the development of individual managers within the spectrum of the organisation; this concept, known as Management By Objectives, will be considered in more detail in the latter parts of the thesis.

Before studying the next technique, it is important that this motivational influence of a budgeting system should be reiterated bearing in mind that "few individuals are ecstatic about any technique used by the boss to check their performance" (58).

Ideally the budgeting procedure, i.e. the preparation of budgets, should be formulated so as to create an inter-relation between the interests of the firm and those of each individual manager, i.e. any system or technique should encourage managers to act in harmony with the objectives of higher management. Therefore, in using budgets as measures of performance, the aspect of personal motivation must not be ignored.

(6) Standard Costing

This technique could be described as an analytical type of budgetary control: rather than being concerned with the company as a whole, and functions and departments within the company, the technique of standard costing is primarily concerned with the control of product costs.

The definition used by the Institute of Cost and Works Accountants states that standard costing is "the preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence" (63). This definition highlights the similarity with budgetary control and indicates that standard costing is another example in the application of the

principle of "management by exception".

The differences, i.e. "variances" between what the product costs should be (standard) and what they are (actual) are analysed and where possible action is taken to counter the recurrence of excess costs in the future. (Reference to the various types of standard cost is made in Appendices 9 & 33)

The degree of variance analysis will depend upon the particular circumstances but the basic variances arise from the following variations:-

- (a) material price,
- (b) material usage,
- (c) labour rate,
- (d) labour efficiency,
- (e) fixed and variable overhead expenditure, and
- (f) volume of production.

(Again it must be stressed that the basic aim of calculating variances is not to explain them, but to eliminate them.)

With the possible exception of (f), these variations and resultant variances tend to be self-explanatory but not so (f) - "volume of production": when the actual volume of production differs from the budgeted volume, a fixed overhead volume variance occurs. This is because fixed overheads, e.g. administration staff salaries, tend to be unaffected by variations in the volume of production. As a result, because these costs do not change, they will be unrecovered in the standard (normal) costs when a company is working below the normal expected level of activity. A simple case will illustrate:-

Budgeted level of output	20,000 tons
Fixed Overhead	£5,000
∴ Fixed overhead per unit	
(included in standard product cost)	25p

If the actual level of production is only 18,000 tons, then the amount of fixed overhead charged into standard product costs will be -

18,000 tons at 25p = £4,500

Therefore, due to a decrease in production of 2,000 tons, £500 is under-recovered (i.e. 2,000 tons at 25p); this is the fixed overhead volume variance.

Variance analysis has become a rather complex and comprehensive art but in practice it is likely that in any particular organisation there will be a tendency to concentrate upon those variances which are considered more important, e.g. material usage variance and/or labour efficiency variance. However, it must not be overlooked that not all variances are controllable, i.e. not all variances "can be identified as the primary responsibility of a specified person" (63).

(Sales variance analysis has not been discussed, mainly because of the fixed-contract price situation in the construction industry. However, it is contended that within the technique of Budgetary Control, budgeted order book/sales levels when compared with the value of the actual contracts which materialise, will tend to measure the efficiency of the marketing functions: (Appendix 32).)

One of the fundamental problems in the sphere of standard costing is the setting of the standard; the consensus of opinion indicates that the standard should be an attainable one. Such a standard can, therefore, be used not only as a basis for the selling price, but also as a measurement of performance; in regard to the latter, such a standard represents a reasonable performance which will have the desirable motivational impact on employees.

Notwithstanding the possible limitations of the technique, it is contended that standard costing can aid management in the control

of costs; also when based upon work-study standards, it can be used to actually reduce existing costs. Both these aspects are very important in a competitive industry and the application of such a technique should lead the way towards a definite improvement in the efficiency of the company.

(7) Capital Expenditure Project Assessment

Capital expenditure is an essential ingredient for expansion of the national economy particularly when there is a shortage of manpower, and British industrialists are well aware of the fact: however, its control is one aspect which often seems to have been overlooked and until quite recently, very few firms appear to have directed their attention to a consideration of the return on the amount of money spent on capital projects.

Various methods may be used to calculate the return on capital invested, and more than one method may be applied at any one time in order to reach a satisfactory decision.

Some of the methods used in industry are:-

- (a) Pay-Back Period,
- (b) Return on Original Investment,
- (c) Return on Average Investment, and,
- (d) Discounted Cash Flow Technique.

These means of assessing capital expenditure projects will now be briefly considered.

(a) Pay-Back Period

This is usually defined as the length of time which is necessary to equate total income (before depreciation charged) with the original cash outlay.

(Note. It is also considered more practical to consider

the income before taxation as the rates may change over future years causing an inaccuracy in calculations related to those particular years)

Example

Capital Investment = £10,000

<u>Year</u>	<u>Annual Income *</u>	<u>Accumulated Pay-Back</u>
	£	£
1	5,000	5,000
2	5,000	10,000 *
3	4,000	14,000
4	4,000	18,000
5	2,000	20,000

Therefore Pay-Back Period = 2 years *

* i.e. Annual income before deductions for depreciation (and taxation); depreciation is in respect of cash previously expended upon purchase of the asset.

As may be appreciated by this example, the pay-back period method of assessing the worth of capital expenditure projects, has the basic advantage of simplicity but it does not allow for the discounting of future income (see (d) below). In addition, it does not by itself measure profitability; a shorter pay-back period does not necessarily mean that one project is preferable to another.

(b) Return on Original Investment

This method again has the advantage of simplicity; however, it is argued that because the original investment is used as a basis for its calculation, the return will be under-stated when expressed as a percentage of the investment.

Example

$$R_o = \left\{ \frac{(T I - D)}{N} \div OC \right\} \times 100\%$$

Where:-

R_o = Return on Original Investment

TI = Total Income

D = Total Depreciation (= Capital Invested)

N = Number of Years

OC = Original Capital Investment

Using figures in previous (pay-back) example:-

$$\begin{aligned} R_o &= \frac{(\pounds 20,000 - \pounds 10,000)}{5} \div \pounds 10,000 \times 100\% \\ &= \underline{\underline{20\%}} \end{aligned}$$

(Note. This is the return after depreciation,
but before taxation)

(a) Return on Average Investment

To offset the inferred criticism of the last method, i.e. the use of the original investment figure leads to an under-statement of the percentage return, the average investment can be used as an alternative basis. Over the life of the capital expenditure project, half the original investment is assumed to be the equivalent of the average investment. Again, simplicity is the key-note.

Using previous figures:-

$$\begin{aligned} R &= \frac{(\pounds 20,000 - \pounds 10,000)}{5} \div \pounds \frac{10,000}{2} \times 100\% \\ &= \underline{\underline{40\%}} \end{aligned}$$

(d) Discounted Cash Flow Technique

The previous methods suffer the same limitation; they do not allow for the discounting of future cash flows. This principle of discounting is applied within this technique, in order to accurately assess the worth of a capital project to be commenced at the present time. The technique allows for the fact that money received now is more 'valuable' than money to be received at some future time, in the sense that it may be immediately re-invested (internally and/or externally) and thereby earn interest/a return on capital.

Illustration

If it is assumed that the required rate of return is 20% p.a., £100 invested at the present time and so invested at this (required) rate would result in a growth of £20, i.e. £120 in total. Therefore, in order to maintain this required rate of return, a delay of 1 year, in regard to income would mean that the income on a project would have to be increased by over £20 in order to be comparable, i.e. (£100 + £20) at (20%) discount factor of .833 (Appendix 10) = £100. (Future cash flows are discounted in order to convert them to a present-day valuation) Where a minimum acceptable rate is specified (= cost of capital to the company) this approach is termed the Net Present Value Method (NPV); where a true rate is calculated by equating cash inflows, this is termed the DCF (yield) method.

Because this technique specifically weighs the time value of money, it is to be recommended for use in connection with long-term decisions.

One final comment about the assessment of capital expenditure projects; the various methods previously described are based upon estimates of future income. Even the application of the more sophisticated discounted cash flow technique only offsets any possible inaccuracy in these estimates to a limited degree; any method of approach is dependent upon the accuracy of the basic assumptions and information. Therefore, whenever practicable, it is suggested that actual future cash flows should be compared with the pre-determined estimates, in order to prompt possible remedial action on the part of management. In order to determine the impact of fluctuations in the basic data, sensitivity analysis and risk analysis may be used to advantage. "Sensitivity analysis is an attempt to show how a project's profitability may be affected by variations or changes in an element of project revenue, operating costs or investment. In risk analysis, probability factors are attached to sales, costs and other elements of the proposal and calculations made of the probability of alternative project outcomes" (112).

(8) Internal Ratio Analysis

This technique applies when individual companies select certain accounting ratios in order to measure the company's historical pattern of profitability and liquidity; the relevant items are extracted from the Profit and Loss Account and the Balance Sheet of the particular company.

Some of the more useful ratios include the following:-

- (a) Profit: Sales Revenue,
- (b) Sales Revenue: Capital Employed,
- (c) Profit: Capital Employed,

(d) Current Assets: Current liabilities,

(e) Liquid Assets: Current liabilities,

(f) Debtors: Sales Revenue,

(g) Stock: Sales Revenue.

((a) - (c) are concerned with profitability and (d) - (g)
are concerned with liquidity)

When using these ratios it is important that the constituent items are carefully defined in order to maintain consistent interpretation over the years; accurate trends may then be indicated which should prompt any necessary remedial action on the part of management. (A more positive approach would be to calculate budgeted (required) ratios against which the actual ratios could be compared.) With the passage of time, the need to revalue assets should also be assessed in order not to invalidate the comparisons, e.g. it is incorrect to compare current profits with an out-dated capital employed evaluation.

This technique may also apply to costs, whereby the various elements of cost are related either to the total cost (or total sales revenue) and expressed as ratio or percentage. Other data, e.g. actual hours v. standard hours, may be extracted and compared if a more extensive range of ratios is considered appropriate (81 & 114).

Although the calculation of such ratios may be relatively simple, the interpretation of their significance and meaning is difficult. Ratio analysis gives only indications of a situation and must be seen against the background of the nation's economic position and in relation to other techniques, particularly inter-firm comparison, which will now be considered.

(9) Inter-firm Comparison (including Uniform Costing)

The technique of inter-firm comparison tends to be a natural

extension of internal ratio analysis. Interested companies send to a central institution, such as the Centre for Interfirm Comparison or the appropriate Trade Association, both financial and cost ratios on a uniform basis and in return receive comparable figures of other firms, which may be used by the individual firm as:-

- (i) an instrument of self-diagnosis,
- (ii) a means of evaluating its own profitability and productivity, and,
- (iii) a basis for setting targets of performance.

It will be appreciated that a fundamental requirement in any such scheme is that information should be exchanged on an anonymous basis.

(Obviously, comparisons of this nature tend to be far-reaching; in fact, one of the disadvantages of standard costing is that it does tend to cultivate an insular approach.)

Such comparisons (allied with internal ratio analysis) give a measure of relative performance in changing trade conditions, show the trend of performance and enable an important check to be made of the effects of action(s) taken as the result of previous comparisons. (The U.K. Government supports this view, as indicated by its direct financial assistance to the Centre for Interfirm Comparison; over £200,000 spread over six years up to September 1972.)

However, the main problem with inter-firm comparison stems from the comparing of "like with like". Often there are differences in the treatment of figures by different organisations (in spite of circulated literature) and care must be taken not to read too much into the "comparison", which may not be a true one. In addition, even where companies produce and sell the same product for the same market, they are not strictly comparable.

Concluding Comment

The extent of the coverage of the techniques which are normally associated with management accountancy has naturally been limited within the framework of the thesis, but it is suggested that the extent of the discourse has been adequate. Nevertheless, every effort has been made to create a comprehensive and self-contained review, so as to contribute towards the continuity and evolution of the thesis.

The next part will include an assessment of the extent to which the aforementioned techniques are being used, improved and extended in the construction industry.

PART IV

AN ASSESSMENT OF THE EXTENT TO

WHICH THE VARIOUS MANAGEMENT ACCOUNTANCY

TECHNIQUES ARE CONSIDERED RELEVANT TO

THE CONSTRUCTION INDUSTRY

PART IV

AN ASSESSMENT OF THE EXTENT TO WHICH THE VARIOUS MANAGEMENT ACCOUNTANCY TECHNIQUES ARE CONSIDERED RELEVANT TO THE CONSTRUCTION INDUSTRY

Section 1

INTRODUCTION : SYSTEM OF PROCEDURE

As will be appreciated, within the natural limits of the thesis, it would be impracticable to consider a fully comprehensive assessment of the extent to which each of the various management accountancy techniques is considered relevant to the construction industry: it is suggested that any extension of the assessment included in the thesis would only marginally contribute to the conclusion and this viewpoint is subscribed to by Sir Harold Emerson in his "Survey of Problems" - 1962 - (84) "organisations representing the interests of the industry have had the opportunity to express their views and a more protracted enquiry is not likely to reveal either further problems or hidden solutions". Therefore, the following method of approach has been applied.

Initially, a simple preliminary questionnaire was circulated to various quantity surveyors (in the capacity of "economists/accountants" of the industry) in order to assess whether or not the various techniques are thought to be applicable to the construction industry: so as to gain a complementary viewpoint, various consultants associated with the industry were also approached to reflect their experience in relation to the application of management accountancy principles.

A second (and more detailed) questionnaire was circulated on a national basis to accountants, directors, managers and foremen associated with the construction industry in order to establish indications as to the actual use, improvement and development of the various management accountancy techniques by these accountants in their individual companies: as a further development of this second questionnaire, several of the responsive organisations were visited and as a result a more detailed appraisal of their individual situations was evolved.

Finally, two of the latter have been treated as "representative" of different sized companies in the industry (see Part II - Section 1) and are included in the thesis as case-study material, together with similar material in respect of three other companies which have significant features in connection with sub-contract work, development of certain techniques and / or a record of success within the industry.

(This approach is similar to the one advocated by Professors Mautz and Gray (79) i.e. research should deal with empirical data obtained through questionnaire, interviews and case studies.)

Section 2

THE PRELIMINARY QUESTIONNAIRE CIRCULATED TO QUANTITY SURVEYORS

Design of Questionnaire

The simple questionnaire (Appendix 11) was designed and circulated in order to gain an indication of the possible scope for the application of the various management accountancy techniques to the construction industry. It was directed to quantity surveyors who were predominantly employed by the Ministry of Public Buildings

and Works and had a wide experience of dealing with different sized contractors within the heterogeneous construction industry.

Bearing in mind this experience and their appreciation of the significance of the various techniques associated with management accountancy - as a result of "post-graduate studies" (Appendix 12) - it is considered that their consolidated viewpoint on the potentiality (or otherwise) of the techniques is indicative, notwithstanding the limited scope of the sample and its inherent limitations. (Therefore, the percentages included within the commentary should be viewed with the necessary reservations.)

This simple, preliminary questionnaire was designed in order to obtain an affirmative or negative indication as to the potentiality of the various techniques; however, so as to encourage the participants to reflect their experience, they were asked to qualify their answers.

Commentary on replies

Summary of the response (Appendix 12) indicated that the majority of the techniques are considered to be relevant and applicable, the exceptions being the inter-related techniques of uniform costing and inter-firm comparisons: the replies in respect of each technique will now be considered.

Internal Audit

Suggested areas of application (by the 78% who considered the technique applicable) were to increase accuracy or detect errors of accounting principle or speedily detect and thereby prevent fraud in respect of:-

- (a) bonus calculations,
- (b) material procedures,
- (c) plant records,

- (d) cost classification,^M and
- (e) overhead calculations.^N

(^M Applies to both Head Office and Site procedures)

Of those respondents who were either undecided or considered internal audit unrealistic, (22% of total), the majority were concerned as to the costs involved in the introduction and maintenance of this technique. One interesting comment was that internal audit would "infringe upon the delegated accountable line (site) management responsibility". (Although it is natural for site management to dislike this "watchdog" approach, higher management will tend to accept site-originated data with more confidence; also it could be argued that the site manager should not be unduly concerned with the mass of detail which stems from, e.g. bonus calculations.)

Marginal Costing

88% of the total respondents considered that this technique could be applied in the following areas:-

- (a) tendering; particularly when short of work,
- (b) presentation of information to lower levels of management; foreman finds it easy to associate himself with marginal costs,
- (c) site profitability; the "contribution" of each site to head office fixed overhead costs can be calculated.

The small number (12%) who were not convinced as to the practicability of applying marginal costing to the construction industry, stressed the difficulty of analysing the marginal costs on site and also indicated that it is more realistic to trace many so-called fixed overhead costs to the site; this point tends to be valid when a civil

engineer is spending all his time on one or two contracts of long duration. In regard to the former criticism, i.e. difficulty in assessing marginal cost, the tradition of casual labour within the industry may also tend to accentuate this difficulty.

Break-even Analysis

Nearly a third (32%) were either undecided or doubtful about the possibilities of this technique. The "one-off" nature of the industry was mentioned as against the industrialised building unit where the technique could be applied; another doubt expressed was concerned with the complications which can arise in connection with weather hold-ups, site variations, retentions and delays in final payment.

The previously mentioned point about the application of break-even analysis to an industrialised situation, e.g. window manufacture, was one of the areas suggested by the remainder (68%); it was suggested that this technique could be modified and applied to individual projects where there is a possible interplay between fixed and variable costs, e.g. plant ownership v. plant hire or where alternative types of construction are feasible. (This aspect will be considered at a later stage within the context of suggested applications.)

Long-term Forecasting and Planning

Over two-thirds of the respondents (69%) indicated that the technique of long-term forecasting and planning (for say five year periods) could be applied to the industry and the following points were made to support this view: the technique could be useful in these situations:-

- (a) in the long-term control of head office costs

(including capital expenditure) of the larger organisation,

(b) where the policy of the organisation was one of expansion which would possibly necessitate the anticipation of increased funds, e.g. new capital issue, and

(c) where the organisation is involved in an industrialized building situation.

Although only 31% commented upon the impracticability of the technique, their experience of the industry was reflected in various statements related to the difficulty of accurately assessing long-term demands: the non-continuous volume of work from clients - particularly the Government - makes long-term forecasting and planning so much guesswork. (However, it could be argued that a forewarning of these fluctuations in work-load, via the use of the long-term forecasts and plans could aid the marketing function of the organisation; this aspect will be developed at a later stage.) Complementary to the previous comments is the fact that changing Government policy can make quite a marked contribution to market fluctuations in the construction industry; also as most contracts tend to be for less than two years, a five-year base for forecasts and plans may prove to be unrealistic.

Budgetary Control

As a development of the comments under long-term forecasting and planning, it was not surprising that all the respondents considered that budgetary control is applicable to the industry, the shorter time-base being the obvious advantage; contracts gained can be quantified and form the basis of the technique, rather than the "guesswork" which is required in the application of long-term forecasting and planning.

The quantity surveyors agreed that budgetary control could be applied as an "umbrella" system within the construction industry,

i.e. it should cover both head office and site costs. It was suggested that the technique could be more realistically applied to the various contracts/projects rather than say, periods of three months. (However, as each contract will normally have to be completed within a time-scale, the two aspects would tend to be inter-related within the total spectrum of the contractors' business.)

The other important aspect of budgetary control was also mentioned, the aspect of co-ordination; it was suggested that a full commitment to the technique would improve the co-ordination between the many and varied "professionals" in the industry (i.e. the architects, consultants, engineers, quantity surveyors, estimators and accountants).

Standard Costing.

68% of the respondents appreciated that this technique could be used within certain areas of the construction industry, e.g. in repetitive situations (house-building and system building; industrialized unit manufacture). It could also be used as a means of controlling site labour, particularly where the standards originated from a work study base, i.e. time and motion study. This technique of standard costing was also envisaged as a natural development of existing estimating activities of the industry; (its application to site-operations control will be considered in Part V).

Approximately one third (32%) of the respondents considered the technique impracticable; the "cost of costing" was again mentioned in view of the accumulation of possibly ineffective data, i.e. standard operation costs, actual operation costs and variances between standard and actual.

Another point against the application of standard costing to the construction industry was the impracticability of predetermining

"true" costs; one factor to be considered within this area is the comparative non-acceptance of work study engineering in the industry as compared with factory based industries. This viewpoint was subscribed to in that it was stated that "no two jobs are alike" and "each job is entirely different", so making work study difficult.

Capital Expenditure Project Assessment

A large majority (86%) considered that the assessment of various capital expenditure projects is realistic in the construction industry particularly in relation to plant and equipment; it is also necessary to prepare the costs involved in the purchase as compared with the hire of plant and equipment in the industry. It was stated that such a technique is "common sense in any industry" and its application would ultimately contribute towards the maintenance (or growth) of the return on capital.

One respondent suggested that capital project assessment techniques could be far-reaching in the industry to cover the following facets:-

(i) in the design organisation - to establish total cost of alternative design solutions,

(ii) in the client organisation - to establish priorities between projects, and

(iii) in the contractor organisation - to establish investment priorities in plant, i.e. fixed assets.

In regard to (iii), one of the few respondents (14%) who were either undecided or considered such assessments inappropriate, considered that irrespective of indications of the various bases, the contractor has no choice but to invest in the present competitive state of the construction industry. (However, the possible alternative of plant-hire must not be overlooked.)

Internal Ratio Analysis

Nearly three-quarters (74%) were in agreement as to the relevance of this technique to the industry; 20% subscribed to the opposite viewpoint and 6% were undecided.

The main point made by the latter two groups was that management in the industry would tend to be confused by information presented in this particular form. (The question of the need for "education" in this sphere will be considered in the final part of the thesis (VI))

It was suggested, by those who considered the technique an appropriate one, that ratio analysis could aid management in the following ways:-

- (a) comparing (i) each branch (or department) within the company
or (ii) each company within a group of companies,
- (b) monitoring the costs of head office/administration over a period of time,
- (c) measuring (i) the liquidity and also
(ii) the efficiency (= profitability) of the company and
- (d) a study of (a), (b) and (c) would aid the development of policy at Board room level.

Uniform Costing and Inter-firm Comparison

Because of the similarity of these techniques, the response from the participants was the same, i.e. only 45% answered in the affirmative and 57% were either undecided or considered the application of these two techniques to be impracticable. (This was the only case when a larger proportion of the respondents indicated that a technique

was inappropriate.)

If such schemes are to be effective (as they would seem to be - see Part V), contractors must co-operate; if they are in similar trading (construction) situations, such comparisons could prove useful and could also increase the degree of efficiency and competition in the industry. It was suggested that such inter-firm comparisons would be facilitated by the introduction of the computer, but even so, the information circulated must be kept in the form of ratios and percentages; actual figures would not be given by contractors because of the highly competitive nature of the industry.

The majority of the respondents stressed that the intense rivalry in the construction industry would tend to negate the effectiveness of these two techniques, those participating being likely to pay only "lip-service" to any such scheme by submitting information which lacks the necessary uniformity for a realistic comparison: this view is consistent with the inadequate means of cost collection operative in the industry. It was also suggested that differing company structures in terms of the types of capital invested and the type of work carried out would tend to invalidate the comparisons under both uniform costing and inter-firm comparison techniques.

One final comment highlighted the significance of the tendering procedures which are based upon uniform quantities in the highly competitive industry: this procedure in effect is an indirect means of inter-firm comparison, i.e. the most efficient contractor will gain contracts at the expense of the inefficient who will ultimately "go to the wall".

Conclusions

It would seem that the consensus of opinion indicated that there is scope for the application of the various management accountancy techniques, the only exceptions being uniform costing and inter-firm comparison. However, many of the others would have to be modified to suit the particular needs of the construction industry; (this is true in any industry; i.e. management accountancy techniques have to be adapted to the needs of management in the individual company within the particular industry). In fact, crude forms of these already are in use (see confirmation in response to detailed questionnaire and case studies - Part IV). "The difficulty is that in many cases more refined techniques cost more than the benefit they bring: also it must be remembered that the construction industry is by no means homogeneous and large differences exist between the techniques applicable to, e.g. a speculative house builder and a general contractor."

In the next section (3), the viewpoint of the consultant will be considered in order to either substantiate or otherwise the consensus of opinion put forward by the professional quantity surveyor. (Also, in Section 4, the viewpoint of the consultant will be confirmed or otherwise by the indications of the actual usage of management accountancy techniques and in Part V there will be a comparison between the potential usage indicated by the quantity surveyor and the actual usage indicated by the consultants and the accountants.)

Section 3

THE CONSULTANT'S VIEWPOINT

Introduction

As previously indicated, this particular section has been included in order to formulate a link between the scope for management

accountancy techniques as intimated by the quantity surveyor(s) and the actual use of the various techniques as indicated in the response to the questionnaire circulated to accountants (and managers) and which will be considered in the next section of the thesis (Section 4).

Six consultants were approached with a request that they contribute to the area of research covered by this thesis by referring to the detailed questionnaire (originally circulated to accountants) and reflecting in their replies an indication of their experience of the industry and also the present situation in the construction industry in regard to management accountancy techniques.

(Although it is accepted that subjective opinions as distinct from facts are not as significant, it is suggested that this approach is valid within the context of the thesis and particularly bearing in mind the inclusion of actual case-study material from different firms in the industry.)

Four of the six consultants co-operated to various degrees and their considered viewpoints are herewith summarized, together with an evaluation.

Consultants' Views: General Comment

The industry is in two camps; on the one hand there seem to be contractors who take an objective view of cost reporting and financial controls and forecasts and apply those techniques which are likely to meet their needs. The remainder of the industry appears to work on an extremely ad hoc basis and accounts historically for completed contracts. This division is dependent on the size of the companies concerned, i.e. the larger contractor tends to use the range of techniques associated with management accountancy.

Reporting of Accounting information

Most companies seem to report current (contract) costs on a monthly basis with interim weekly reporting on items which are likely to change very rapidly, e.g. site labour and plants: the amount and frequency of information required by the site manager and site foreman depends upon the degree of de-centralisation and the resultant extent to which site management is able to influence/control the various construction costs.

Dual Tenders (i.e. one based on details submitted by customer's consulting engineer and one related to contractor's own interpretation of the particular contract.)

The submission of alternative tenders seems to be becoming more common; this is particularly so with contractors who offer construction systems and to a lesser degree those who as a separate activity undertake "Package Deals". (Within this and associated areas the consultant may well take over some of the organisational duties which a contractor does at the moment, particularly where use is made of a computer by the consultant.)

The trend in tendering seems both in the private and public sectors to be towards selective tender lists and negotiated contracts; in the public sector this may be largely due to the Banwell Report (83) and the private sector due to a greater mutual confidence between the manufacturing industry and the construction industry (92).

Influence of the various organisations associated with the industry.

At the present time, there seems to be no major influence being exerted by the various bodies, although the Construction Industry Training Board are in the process of developing courses on financial management geared to the requirements of many sections of the industry.

As far as the professional institutes are concerned, there are few signs of direct interest in the construction industry and the only possibility is that the Institute of Cost and Works Accountants might develop an interest in the medium term (due to their more dynamic approach to management accountancy.)

Perhaps those universities which have departments of financial management/control could develop research in relation to the construction industry; also, at the present time, only three universities and two polytechnics are aiming to run management accountancy courses for the industry.

Contract Execution

Every site manager must appreciate the important inter-relationship between the speed of execution and both the technical and financial implications of each and every contract. His job is to comply with the drawings and specifications within the cost allocated by his company and within the agreed time programme.

Influence of accountants in the industry

The degree of participation by accountants in management is probably limited by the strength of the quantity surveyor as "accountant to the industry" but there are companies where the majority of the management appear to be accountants. (Case-study E - Part IV Section 5 - details the various disciplines of a directorate.)

Usage of the various techniques

Internal Audit

This technique is being used within the audit of systems/management efficiency, rather than in the traditional internal audit approach: this applies particularly in the larger company where a "Management Services" department is in evidence.

Marginal Costing

In the smaller/medium sized firms marginal costing is used but without any real knowledge and appreciation of the technique. In general terms, the tendency is for use in the short term and in relation to a policy geared towards the capture of additional work and entry into new markets.

Break-Even Analysis

Possibly due to the lack of influence by the accounting profession, together with the nature of the work, the construction industry does not think in terms of fixed, semi-variable and variable costs: also due to the fact that sales revenue is often subject to claims, etc. and very little of the industry is concerned with unit costing, this technique has obvious limitations. However, an awareness of these constraints could indicate the validity of this technique, particularly where fixed costs are significant within the cost structure of a contract.

Long Term Forecasting and Planning

The larger groups and companies in the U.K. employ economists who are likely to be involved in forward planning; if this is the case the forecasts and plans will tend to be very broad in character and be concerned with the availability of raw materials, land and other natural resources. (As a result, forecasting and planning of financial requirements will also be considered.)

Budgetary Control

The smaller firm finds it difficult to apply this technique in the strictest sense because of the many small "one-off" contracts in which it is involved. In the medium-sized firms there has been a recognisable development of budgetary control: in the past it has been

restricted to the control of individual contracts and cash. A change is now occurring and the technique is being applied in its accepted traditional sense, i.e. it is being related to the company's (total) activities (in line with the approach of the larger companies).

Standard Costing.

When this technique is used, the application tends to be of an experimental nature and as a result very much a "hit and miss" affair. This limited application of standard costing relates to situations where the work study approach has been introduced into a firm's battery of techniques; (by inference, the non-acceptance of work study in the construction industry has contributed to the limited use of this particular technique using method and time study bases).

Capital Expenditure Project Assessment

The industry sees little advantage in the use of capital expenditure (assessment) techniques; (this is possibly due to the relatively smaller amounts being involved in capital expenditure as compared with revenue expenditure in the construction industry). However, appropriate areas for such an assessment seem to be house-building and property development which involves a proportionately higher capital investment.

Capital expenditure project assessment is applied in a wider sense in the construction industry than in manufacturing industry; where a regional structure applies within a firm, it is usual for senior managers to search for and select projects (involving capital and revenue expenditure) and then apply a cut-off rate (% return on investment) before submitting to their head office.

The pay-back method is used extensively with investment decisions in relation to capital expenditure upon plant and vehicles

because it emphasises the time period and, therefore, can be (more readily) related to individual contract time scales.

Internal Ratio Analysis

This is a technique which is used infrequently within the industry although the Construction Industry Training Board have developed various programmes in order to encourage its use. The general opinion seems to be in favour of an adulterated approach which achieves some success.

Uniform Costing and Inter-firm Comparison

Various schemes have developed over the last ten years; these have been supported by the Construction Industry Training Board, the National Economic Development Office and the respective Trade Associations, e.g. Heating and Ventilating Contractors Association. Generally these schemes of inter-firm comparison cater for the medium to large firms and the National Economic Development Office is at present looking into ways of assisting small firms on a simpler basis.

Other Techniques

Firms are considering the question of financial management as it relates to the level of gearing in their present (and possible future) capital situations; again encouragement stems from the Construction Industry Training Board (see Part VI).

Conclusion

According to the four consultants participating in this research survey, the prevailing attitude in the construction industry is that the most formal management accountancy techniques are not strictly relevant to its situation; the tendency seems to be to use modified versions of the standard practices. Insofar as it is possible to evaluate such a composite view, it is contended that the inherent

indications complement the potential already discussed within the contributions of the quantity surveyor(s); however, in view of the extreme difference between the experience of the consultants and the author of this thesis, it would be presumptuous to add any further comment or inferred criticism.

Section 4

THE DETAILED QUESTIONNAIRE CIRCULATED TO ACCOUNTANTS AND MANAGERS (APPENDIX 13)

Design of Questionnaire

The main purpose of this second and more detailed questionnaire was to act as a means of accumulating data and also creating a supplementary framework for the case studies.

It was circulated in order to gain an indication of the extent to which the various techniques are being used, improved and developed in the construction industry; also the questionnaire covered other associated topics, e.g. the extent of submission of dual tenders to clients. As it was primarily circulated to accountants, it was anticipated that the recipients were familiar with the various terms included in the questionnaire.

The questionnaire was designed to indicate the various types of participating firms, bearing in mind the diverse nature of the industry and the extent to which the value of work is concentrated in different sized firms (see earlier part of thesis: Part II - Section 1). An indication of the professional qualifications of the various levels of management was requested, together with their accounting needs, whilst the accountant was asked to indicate his role in the company and the extent to which the various techniques were in operation.

Response to Questionnaire (Appendix 14)

The response was encouraging, particularly as the industry has been inundated with questionnaires and various Government returns over the past few years and as one of the responding consultants commented, "some of the details asked for in the questionnaire require a certain giving of information which my experience of contractors tells me they keep very close to their chests". This attitude was confirmed during the completion of the thesis and a direct reference will be made at a later stage (Case Study A). In addition, the period 1969-70 has been a difficult one for the industry and an intense degree of competition has been experienced.

(Note. Personal interviews were conducted in six companies in addition to those necessarily carried out in connection with the case studies.)

It is suggested that the good response of 33.9% (see Note § - Appendix 14 for comparison) reflects the procedure applied to this particular aspect of the research undertaken, i.e.

- (i) the questionnaire was directed principally to accountants and was concerned with their particular discipline,
- (ii) a follow-up procedure was adopted,
- (iii) personal interviews (at which the confidential nature of the enquiry was confirmed) were carried out; (Appendix 13 was used as a basis for these structured interviews), and
- (iv) local participation was excellent (55% of effective respondents represent firms in the East Midlands area).

Although the circulation of the questionnaire did not cover a sufficiently wide sample to establish valid conclusions, the implications of the results may be considered adequate when viewed in conjunction with the earlier submissions of both quantity surveyors

and consultants and as a framework for the case studies. (Therefore, in view of the inherent limitations of such a survey, typified by (1) above, the percentages included within the following commentary on the replies must be viewed with reservation in order not to misconstrue the extent of their statistical significance.)

Commentary on replies

Nature and Extent of activities of the firms (Appendix 15)

Although the vast majority of the respondents were involved in the construction of schools, houses and multi-storey buildings, the full range of activities of the industry was covered by them, i.e.

- Motorways,
- Roads,
- Tunnels,
- Bridges,
- Single-storey buildings,
- Special laboratories,
- Sewerage plant,
- Pedestrian subways,
- Hospitals,
- Duct-laying,
- Power stations,
- Dams and reservoirs, etc.,

Analysis of response (Appendix 15)

83% of the respondents (i.e. those employing up to 1,199 employees) represented 76.7% of the work done in national terms (see Part II - Figure 2).

The Management and their accounting needs

(1) Higher Management (Appendix 16)

As might have been expected by the nature of work in which the respondents were involved, 39% of the Directors (i/c contracts) had either engineering or building qualifications; however, 44% had no

formal qualification and only 6% were accountants.

The majority (56%) indicated a need for details of all contracts on a monthly basis, i.e. costs and profits (actual, or actual compared with estimate): this monthly requirement reflects the monthly payment procedure associated with the industry.

Although 67% were satisfied with the type and frequency of information received, certain areas for improvement were suggested as follows:-

- (a) speedier presentation of information,
- (b) additional (or modified) information at more frequent intervals, and,
- (c) cost (and values) related to physical progress.

(2) Site Management (Appendices 17 & 18)

Although 23% of the site managers had either a building or surveying qualification, 50% had no formal qualification.

As can be appreciated by their area of responsibility, the site managers expressed the need for contract (site) details, i.e. actual (or actual compared with estimate) costs on a weekly basis and values (in addition to these costs) on a monthly basis.

The 23% dissatisfied with the type and frequency of information received, suggested the following improvements -

- a) speedier presentation of information (also suggested by contract directors),
- b) weekly costs/values comparison (where not available at present) and
- c) details of labour and materials costs (where not available at present).

The site manager's order of priorities in regard to contracts

reflects the nature of the industry insofar as the technical considerations are examined before the letting of the contract, i.e. in drawing up the bill of quantities; in the execution of the contract financial implications were considered to be more significant than the speed of execution. (From the client's viewpoint "the lowest tender is accepted in normal circumstances and, therefore, the financial implications tend to rank higher than the speed of execution".)

Only 11% of the site foremen hold a recognised qualification but "experience and the ability to handle men is probably more vital" in the construction industry. Very few of them express the need for any written accounting information having preference for verbal information emanating from their site manager. ("Foremen are expected to concentrate primarily on quality control and output, financial control being an administrative responsibility".) However, it was suggested that there should be some feed-back of information, i.e. a comparison between labour and material used and scheduled (see additional comment - Appendix 19).

Tendering and Estimating Procedures (Appendix 20)

Higher management indicated that the submission of dual tenders is not prevalent in the industry (56% of respondents never submit an alternative interpretation) and a third of the respondents tend to have between 15% and 19% of their tenders accepted.

Although only 50% of the firms covered in the survey employed standard costs as a basis for the price fixing of tenders, 83% indicated their use as a means of controlling costs as contracts proceed.

Historical costs were used as a basis for calculating these standard costs in the majority of cases (78%); neither work study measurement, use of a historical model or published figures were used to

any great extent.

In most firms represented in the survey (94%) there was some degree of feed-back of information to estimators in respect of current jobs and this information was used extensively for current and future estimates. (A measure of the speed of feed-back was indicated in the extent of usage in these two categories, i.e. whilst 72% used feed-back data in current estimates, 89% were able to utilise in future estimates.)

Influence of the various organisations associated with the industry

(Appendix 21)

Neither the Construction Industry Training Board, the professional institutes or the universities/colleges of technology were felt to be exerting much influence on the industry, insofar as the development of management accountancy techniques was concerned.

(However, it was encouraging to find that 67% of the respondents expressed a willingness to accept a follow-up visit and 39% were willing to co-operate with the academic staff of the university in the development of practical case studies.)

The Accountant and the techniques used by him (Appendix 22)

The Accountant

61% of the accountants had either a Chartered, Cost and Works or Certified and Corporate qualification and the majority of all the respondents in the position of accountant act in the role of financial steward (61%) rather than financial adviser (39%). One in three accountants has spent 25% of his total working life to date in other industries.

Techniques Used

Introduction

All the techniques are used in the construction industry;

(see Figures 13 - 21) however, in the smaller firms (i.e. those employing less than 300) the degree of utilization is either limited or non-existent. Although there has been some modification and development of those techniques traditionally associated with management accountancy, no original ones have been introduced. (Figs.19-21)

(For further detailed study (and possible interpretation) figures 20 & 21 may be viewed collectively in order to quantify the degree to which the various techniques are extensively used by those firms which account for 80.8% of work done.)

In the following brief commentary on the response to the detailed questionnaire, the degree of penetration in respect of each particular technique will be quantified by reference to the indication of total utilization by all the respondents, together with the extent of use indicated by the group of firms which accounts for the 57.6% of work done, i.e. firms employing 1 - 59 and 1,200 plus. (Appendix 23 and Figures 19 & 20)

(This approach - although insular - is considered to be the most appropriate, bearing in mind the unique (and complex) nature of the industry; however, a comparison between all firms covered by the survey and the extent of usage by industry in general is included in Appendices 24 & 25. (For summary see Figure 22)

It is suggested that it is not unreasonable (in view of the detailed analyses - Appendix 23) to subscribe to the point of view expressed by the consultant (Part IV - Section 3) i.e. "the largest companies take an objective view of cost reporting and financial controls and forecasts and apply those techniques which are likely to meet their needs; the remainder seem to work on an extremely ad hoc basis". Therefore, the results forthcoming from the group employing 1,200 and

Use of Techniques in Construction Industry

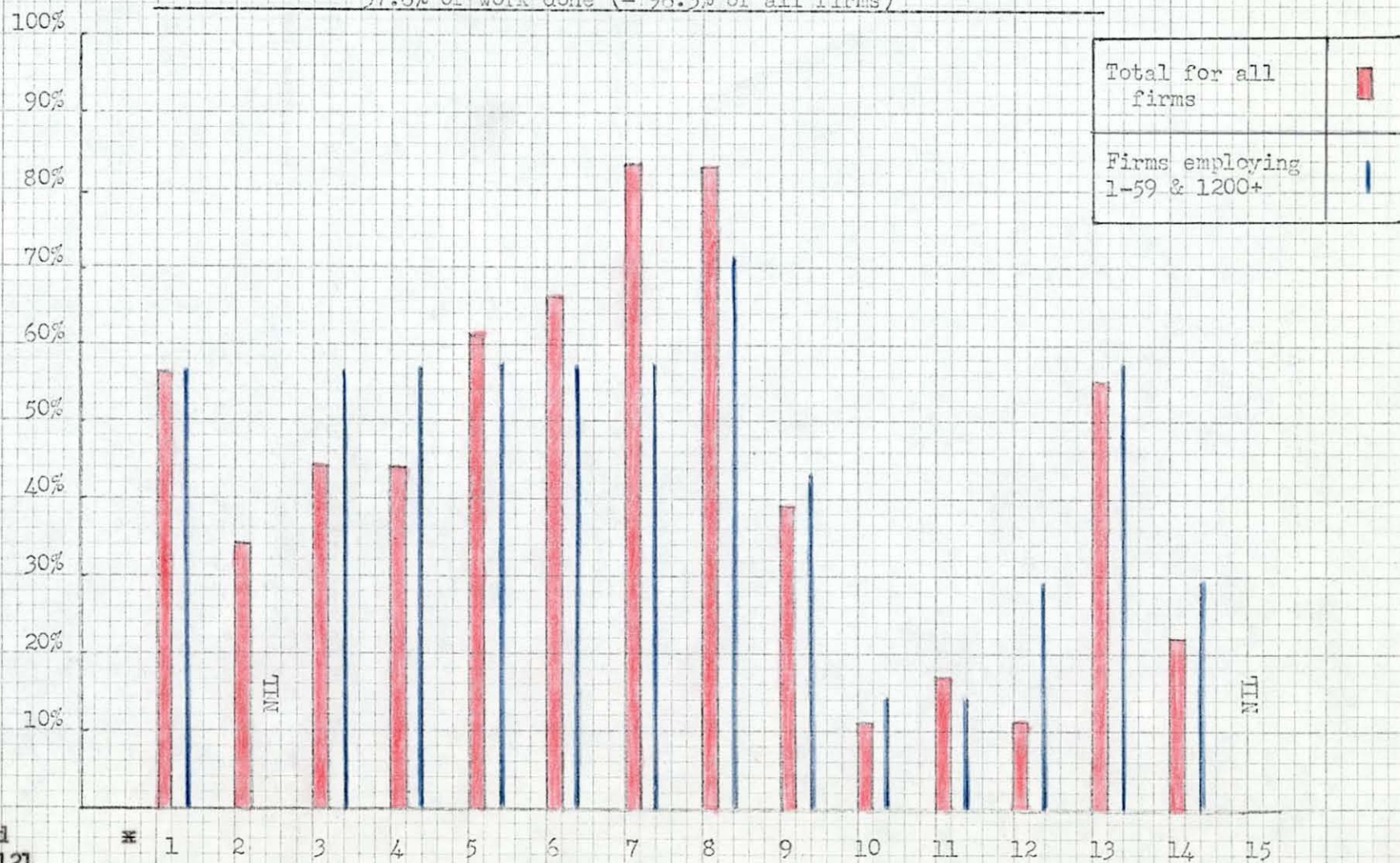
Summary

Name of Technique	Usage (%)		
	Limited (a)	Extensive (b)	Total (a + b)
Internal Audit	28	28	56
Marginal Costing	22	11	33
Break-Even Analysis	38	6	44
Long-term Forecasting	28	17	45
Budgetary Control			
- all aspects	17	44	61
- site control	22	44	66
- cash control	11	72	83
Standard Costing	39	44	83
Capital Expenditure Project Assessment			
- Pay Back	28	11	39
- % Original investment	11	-	11
- % Average investment	11	6	17
(Discounted Cash Flow applied)	11	-	11
Internal Ratio Analysis	33	22	55
Inter-firm comparison	22	-	22

See Appendix 23 for detailed analysis to size of firms.

FIGURE 18

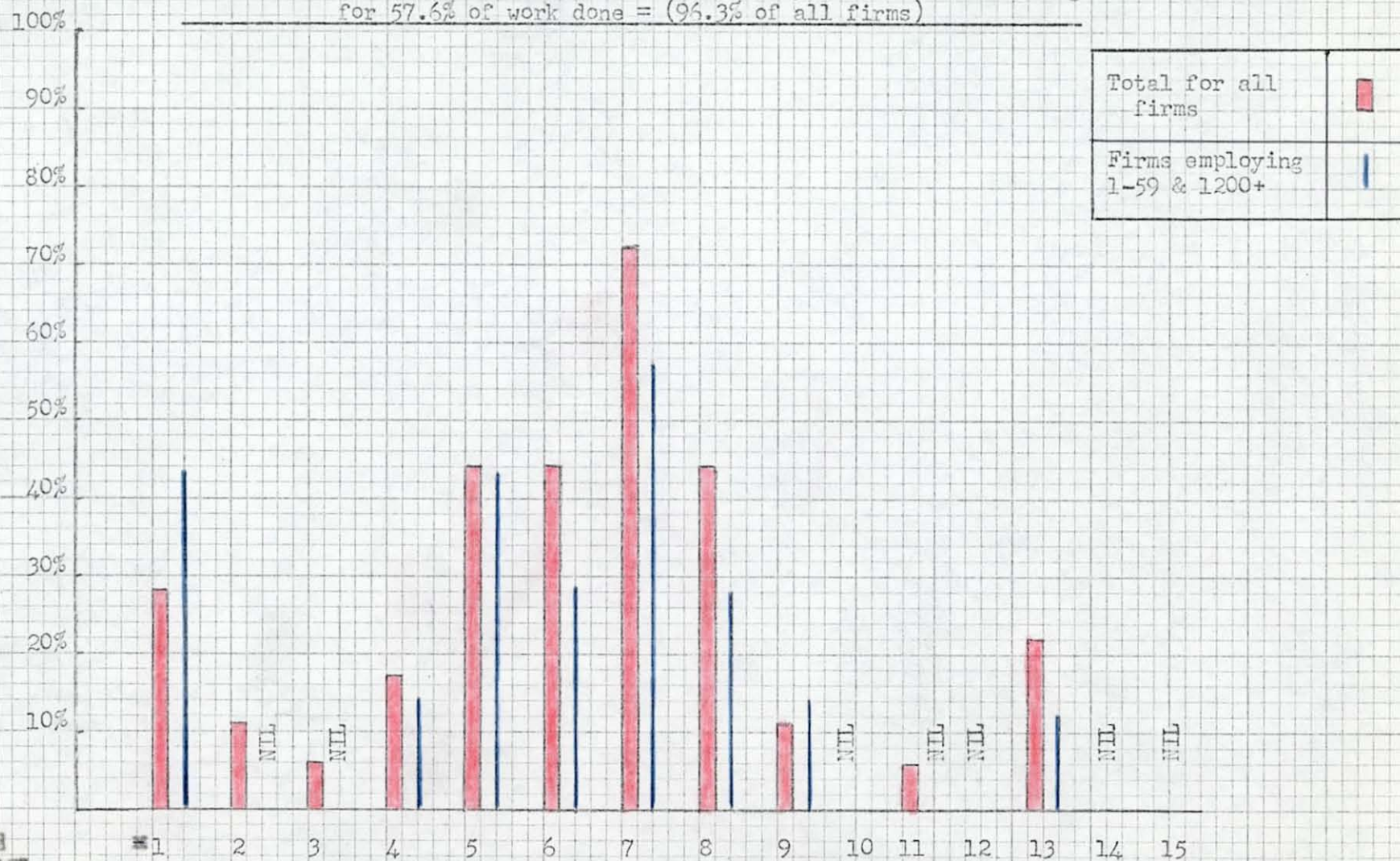
A comparison between all firms covered by survey and those accounting for 57.6% of work done (= 96.3% of all firms)



* For legend see Page 121

FIGURE 19

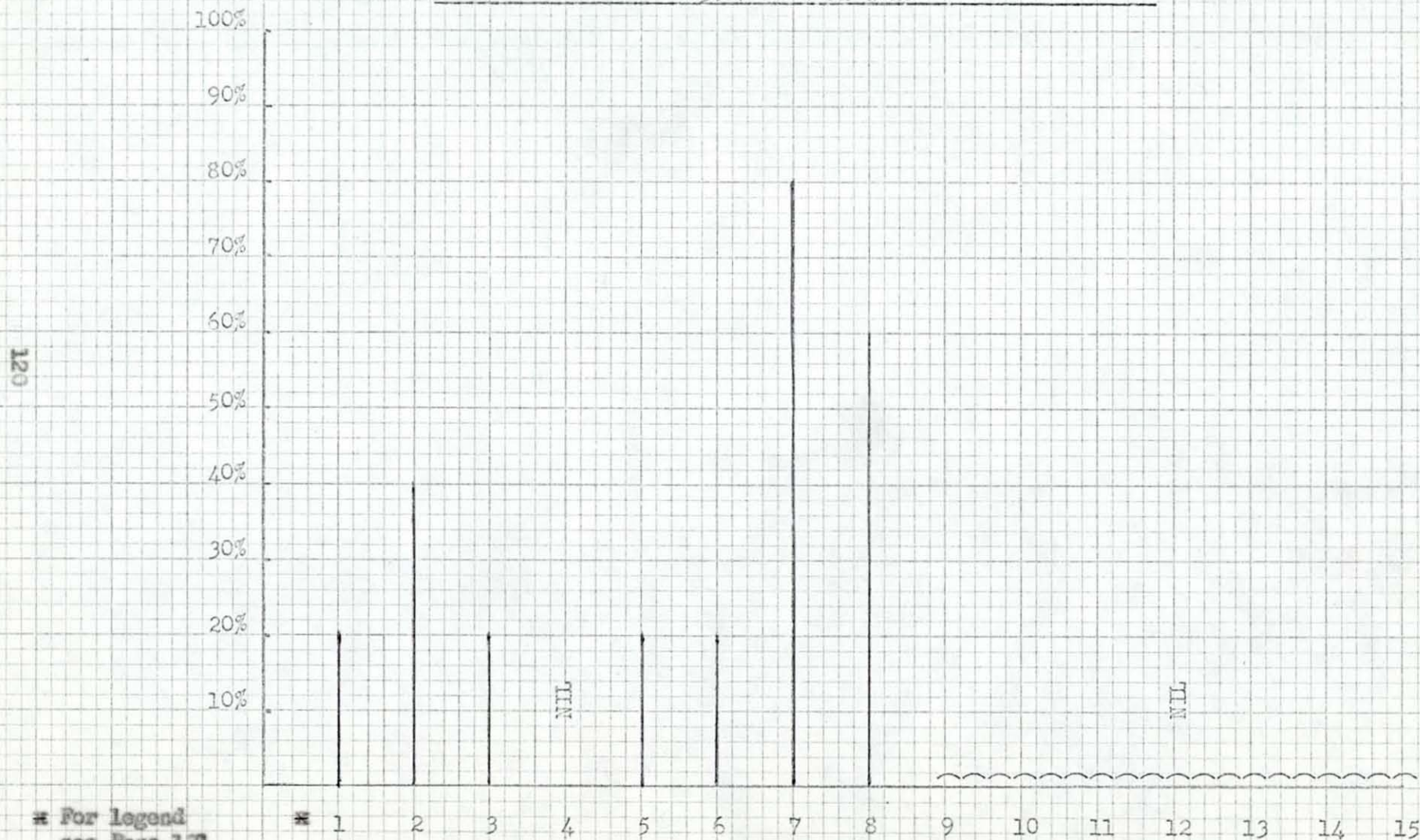
A comparison between all firms covered by survey and those accounting
for 57.6% of work done = (94.3% of all firms)



= For legend
see Page 121

FIGURE 20

By Firms employing between 60 and 299, and accounting for
23.2% of work done



For legend
see Page 121

FIGURE 21

- (1) Internal Audit
- (2) Marginal Costing
- (3) Break-Even Analysis
- (4) Long-Term Forecasting
- (5) Budgetary Control - comprehensive
- (6) " " - site control
- (7) " " - cash control
- (8) Standard Costing
- (9) Capital Expenditure Project Assessment - Pay Back Method
- (10) " " " " - % Original Investment
- (11) " " " " - % Average Investment
- (12) " " " " - Discounted Cash Flow Approach
- (13) Internal Ratio Analysis
- (14) Inter-firm Comparison
- (15) Other Techniques

Use of Techniques

Weighted Comparison between Construction Industry and industry in general

Technique	Utilization (%)	
	Construction Industry	General Industry *
Internal Audit	26	28
Marginal Costing	2	12
Break-Even Analysis	26	8
Long-term Forecasting	26 ϕ	16
Budgetary Control		
- all aspects	26	24
- site control	26	
- cash control	28	
Standard Costing	51 ϕ	12
Capital Expenditure		
Project Assessment		
- various methods	NIL	24
Internal Ratio Analysis	25	20
Inter-firm Comparison	1	12

* Including Construction Industry

ϕ Considering the nature of the construction industry, the extent of penetration indicated tends to negate the criticism regarding attitudes; however, in both techniques application is limited rather than extensive.

See Appendix 24 for
detailed analysis.

(see p.21)

FIGURE 22

over will be used as a "standard" against which other groups will be compared, in order to assess the lack of penetration (or otherwise).
(Appendix 23)

Internal Audit

This technique, although being used by the majority of the respondents (56%) is not used at frequent intervals: the smallest firms' utilization is 'non-existent', whereas the largest firms use it extensively. (However, it should be noted that where a local authority is the client, all work executed as a result of being let to a contractor is the subject of an audit by the local authority. This principle applies to all contractors and, therefore, in the case of the small firm internal audit may well be in operation in an informal sense.)

Marginal Costing

33% of all respondents use this technique but none of those employing between 1 and 59 or over 1,200 indicated their use. However, it is significant that of those firms employing between 60 and 299, 40% indicated extensive use of marginal costing. (This possibly results from the lack of work in the industry when the medium-sized firms find it difficult to compete with the larger firms because of their complex/specialist experience or with the smaller firms because of their flexibility.)

Break-Even Analysis

Although this technique is used by 44% of the respondents, only 6% is extensive use: the pattern which emerges is similar to that related to marginal costing, e.g. a relatively higher degree of extensive use by firms employing between 60 and 299. (This may be anticipated, bearing in mind the contrasting behaviour patterns of marginal costs and fixed costs; their relationship to sales, volume and profit is seen to

best advantage by way of graphical presentation, i.e. by translating the pattern on to a break-even or profit chart.

As previously mentioned in connection with marginal costing, firms in the category employing between 60 and 299 have neither the flexibility of the smaller unit nor the stability of the larger and, therefore, utilization in the competitive tendering situation is expected.)

Long-Term Forecasting and Planning

45% of all respondents and 57% of the group employing 1 - 59 and 1,200 plus, use long-term forecasting and planning. However, notwithstanding the possible different interpretations of "long-term" (although 5 year periods were indicated on the questionnaire), extensive use is indicated only in the larger firms, i.e. those employing over 300. This may be considered understandable in view of their probable degree of specialization and the extensive national/international demand for their work.

Budgetary Control

A comprehensive system of budgetary control is in use by 61% of all respondents; 66% apply the technique specifically to site control and 83% use the technique as an aid in cash control. Even in the area of cash control there is a substantial difference between the utilization of the largest firms compared with the smallest; total use is 100% and 25% respectively. (The indicated lack of use in the area of site control by those firms employing under 300 can be offset by their relatively higher degree of utilization in respect of standard costing - see next paragraph.)

Standard Costing

71% of those firms which account for 57.6% of work done (and

83% of all respondents) use this technique; even the small firms attempt some form of standard costing, but in their case it tends to be of occasional ad hoc character.

(This contrasts with the findings of Batty (9), i.e. building and civil engineering companies stated that they dealt mainly with large contracts to which "all direct expenditure is allocated at actual cost". One company had this statement to make: "Owing to the variety of contracts in respect to type, location and size, the fixing of standards would not be appropriate to this company".)

Capital Expenditure Project Assessment

Although the pay-back method is used by 39% of all respondents, the other methods of capital expenditure project assessment are not considered relevant. However, even the pay-back method is only used in those firms employing over 300. With the exception of the largest firms, the associated technique of discounted cash flow is not used by any section (by size) of the industry and even then it is only applied on an ad hoc basis.

Internal Ratio Analysis

A majority (approximately 55%) of the respondents use the technique, but only 22% of the total on a regular basis; 67% of the largest firms implement internal ratio analysis on a limited scale whereas a similar approach applies in only 20% of those firms employing between 60 - 299 (extensive application in this and the smaller group is non-existent).

Inter-Firm Comparison

Only 22% of all the respondents are involved in any scheme of inter-firm comparison: the majority (67%) of the largest firms do participate but only on an infrequent basis. None of the smallest

firms use the technique, even occasionally. As previously discussed (within the context of the preliminary questionnaire) the intense rivalry in the industry would tend to negate the effectiveness of inter-firm comparison apart from the accepted inadequacy of cost collection systems operative in the construction industry.

Other techniques

No new techniques have been introduced in the firms covered by the survey; however, there has been some modification and development of the existing techniques (see Case Studies A, D, E & F).

In addition to the growth of computerisation, there has also been an increase in the use of network analysis for budgeting purposes (29 & 103); this technique is becoming a prerequisite when submitting tenders and by measuring the likely progress of a project, the simultaneous consideration of the critical path facilitates the budgeting of labour and overhead expenses.

In order to substantiate (or otherwise) the general impression already portrayed, the next section will be devoted to six case studies of firms who are associated with the construction industry and who participated in the survey. This approach is considered preferable (in terms of accuracy) to a detailed interpretation of the general findings of the detailed questionnaire; it also obviates the need to duplicate comment already expressed in regard to the assessment of the quantity surveyors and consultants.

Section 5

SIX CASE STUDIES

Introduction

As previously explained, the following case studies are

included in an attempt to indicate the actual use of management accountancy techniques in the industry. In order to be representative (within the constraints of the thesis) the first three case studies cover different sized firms, i.e. large, medium and small; the others give details of -

- (i) a (medium-sized) sub-contractor,
- (ii) a company which has a record of success, and,
- (iii) a company using budgetary control in conjunction with standard marginal costing.

The diverse nature of the construction industry will also be illustrated within the text of the case studies.

This final section immediately precedes the next main part of the thesis which will be concerned with the possible development of the techniques of management accountancy in the construction industry.

CASE STUDY A - A LARGE CONTRACTOR

General Introduction

This well-known national company in the construction industry has its head office (i.e. the holding company) situated in London; its nine branches/companies are spread throughout the U.K. It has a full range of activities - 15% housing and 85% construction of roads, bridges, etc.; acquisition of land is also an important activity.

Each branch has a Chief Executive with functional executives as follows:-

- (1) Technical/Construction

- (2) Marketing (including Market Research),
- (3) Commercial,
- (4) Personnel,
- (5) Training, and
- (6) Finance (including Land Acquisition).

The company appeared in the 1970 British Institute of Management British Business Growth League with the following ratings:-

<u>1960 - 69</u>		<u>1969</u>
<u>Pre-Tax Profit</u>	<u>Share Value</u>	<u>Growth Rating</u>
		%
+ 400%	+ 588%	+ 650%

$$\% \frac{\text{Total Return}}{\text{Shareholders' Original Capital}} \times 100\%$$

Also recent profit increases (before tax) are as follows:-

<u>Year</u>	<u>Annual Increase</u>
1967	77%
1968	51%
1969	59%
1970	53% [*]

* Profit Forecast of £2½ m. was confirmed in Chairman's Interim Report - 22nd September 1970.

The number employed by this large contractor is approximately 8,750.

The Management and their accounting needs

(1) Higher Management

The Technical Director is a Fellow of the Institute of Builders and indicates a need for a monthly assessment of all contracts

in terms of cost, value and performance. He is not satisfied with the present situation and needs this information more regularly and promptly; this is one reason for the recent appointment (in 1969) of a new financial director who is in the process of introducing improved techniques aimed at better planning and control.

(2) Site management

Both managers and foremen seem satisfied with the type and frequency of accounting information received, i.e. monthly contract cost/value comparisons, but the financial director believes that there is room for improvement and, therefore, hopes to develop this area in order to increase the degree of involvement by site managers and site foremen in the aims of the group. (This will necessitate a degree of "education" on the part of higher management if the results of the detailed questionnaire-survey are any indication; 78% of foremen stated they do not need any accounting information, being more concerned with the technical aspects of the contract. See also Appendix 19.)

Tendering and Estimating Procedures

Occasionally this large contractor is concerned with contracts in which the company submits a dual tender and is becoming increasingly concerned with negotiated contracts. (The percentage of tenders accepted by clients was not available.)

Standard costs are used from both a price-fixing and contract cost control viewpoint and are calculated using both work study measurements and historical costing data but neither a historical nor published cost analyses are used.

The feed-back of information to estimators is not all it could be, although it is used in the compilation of future estimates. Once again, the lack of promptness makes it difficult to fully utilize

the information (in respect of current jobs) as a basis for the revision of the current estimating of future contracts: this aspect is more critical in the dual-tendering situation where quantities in addition to cost of resources may be different.

Influence of the various organisations associated with industry

It was indicated that most of the organisations had little or no influence on the company although the exception was the professional institutes. (This company, because of its size, has tended to develop its "own approach" in the sphere of management accountancy techniques: see later - "Responsibility Accountancy System".)

The Accountant and the techniques used by him

The accountant is professionally qualified and acts as financial steward within the company; only 25% of his total life to date has been spent in other industries.

The extent to which he is using the various techniques will now be indicated.

A general internal audit programme is in use and is applied to all areas of accounting in the company.

As the company is not unit/volume orientated marginal costing is not used but break-even analysis is applied in connection with investment decisions/utilisation of plant.

Long-term Forecasting and Planning is utilized; a three year base is in operation and is projected in order to assess the forecasted profitability of the company. Budgetary Control is in full operation; it covers all aspects (and companies) of the group, including site control and cash control.

As previously mentioned in connection with tendering and estimating procedures, work study based standard costing is used.

All capital investment decisions are assessed by the application of the discounted cash flow technique to the pay-back method.

An internal ratio analysis scheme is in operation throughout the group and covers all the nine companies; the three main ratios compared are:-

- (1) Profit : Sales
- (2) Sales : Capital Employed (interpreted as Total Balance Sheet Assets)
- (3) Profit : Capital Employed (= (1) x (2))

The company occasionally extends the range of the above ratios in order to take part in a scheme of inter-firm comparison; this occasional "check" is considered sufficient by the management.

The recently appointed financial director is currently developing an integrated planning and control system (see below); it is hoped that this will encourage a more dynamic approach to management accountancy, rather than the present passive attitude.

Responsibility Accountancy System (Summary)

Introduction

The system was initiated by the Chief Executive who also set the main associated aims of profitability and growth. In order to introduce it to the managing directors and accountants of the nine companies, a two-day seminar was held by the financial director; as a result the scheme has been accepted by them. (At the present time the financial director is in the process of "selling" the system to site management in the various companies.)

Profitability/Growth Targets

One of the most important aspects of this system is to set

FOR USE IN LIBRARY
ONLY

group and individual company targets; these must establish a demanding yet real management task and may be summarised in the following schedule (Figure 23):-

<u>Group Profit Target Schedule - Year 3</u>		£'000
(1)	Carried-forward profit (on completion) from YEAR 1	-
(2)	Estimated profit for YEAR 2	-
(3)	Extraordinary profit for YEAR 2	-
(1) + (2) + (3)		-
(4)	Loss due to environmental factors	-
∴ Base for YEAR 3 - (1) + (2) + (3) minus (4)		-
<u>YEAR 3 adjustments (+/-)</u>		
(5)	+ { New Business Pricing Policy	-
(6)	+ Reduction of overheads	-
(7)	+ Material Cost Reduction	-
(8)	+ Manpower Utilisation Improvement	-
(9)	- Advertising	-
(BASE + (5 - 8 incl.) minus (9))		-
<u>PROFIT TARGET (YEAR 3) £</u>		-

FIGURE 23

Notes on Schedule

Items 1 - 4 of the Group Profit Target Schedule give some indication of the nature of the construction industry, e.g. the methods of accounting for profit in relation to the time factor (profit on cumulative basis as compared with profit on completion) - item 1; the possibility of extra contracts being completed over and above the anticipated level - item 3; and losses due to, e.g. unanticipated wage awards, curtailment or cancellation of government contracts - item 4. (These items tend to be "uncontrollable", i.e. outside management control.)

Items 5 and 9 originate from the Marketing Function.

Items 6 - 8 stem from the management of the various companies and indicate areas in which management has some degree of control.

Current Development of System

It has already been stated that the system is based upon a realistic assessment of the company's potential. Therefore, what has already been achieved (in terms of the adjusted profit of the previous year) is used as the base in respect of each company.

The marketing function is co-ordinated by the Director i/c Marketing and he decides the level of advertising (item 9) in relation to the amount of firm, anticipated and possible orders/contracts. In regard to pricing policy, although he is concerned with competitive tenders and market penetration he co-operates with the accountant in order to ensure a full appreciation of the various economic factors.

Against this background of new and existing contracts both company and site management are asked to consider the ways in which costs may be reduced (items 5 - 8) in order to increase profits. They have to complete a "Programme of Action" and therein indicate to higher

management how this cost reduction is to become effective; this programme indicates how (e.g.) manpower utilization may be improved, when it will become effective, who will be responsible and the effect of savings on the profit.

This procedure delegates responsibility and also gives individual company and site management the opportunity to show their initiative and technical ability. However, the programme's financial viability is checked by the financial director and also the Profit Target (resulting from the adjustments) is assessed in relation to capital employed (i.e. existing plus additional, where appropriate).

Future Developments of System

In this initial stage, the Chief Executive is visiting all the companies; he will also visit them regularly over the next few years in order to review the "Responsibility Accountancy System".

At the present time the financial director is considering means by which he may use the system as a basis for "Management by Objectives". The objectives will be geared to the attainment of the target profit; considerations under review at the present are:-

(a) If profit attained, flat 10% bonus on salary of each company's managing director, to be split between staff on merit.

(b) 10 - 25% bonus on his salary according to the extent to which profit is beaten, with staff split, and,

(c) bonus on salary related to the "added value per productive-hour", again with staff split.

(It is not inappropriate to contrast the above "possibilities" with relevant information included in a recent publication² which has stated that this company now operates a management share scheme which is limited to selected managers. "A special class of shares, which have no voting rights, are not transferable and receive no dividend,

has been created" and allocated to certain managers. If the shares do as well in the 1970's as in the previous decade (see Introduction to Case Study) the managers will have no reason to complain.

(² Due to the confidential nature of the initial research enquiry, it is not possible to give details of this publication).)

It is hoped that the accounting information system will be extended to cover (more comprehensively than at present) both resources and cash management. Capital expenditure procedures are to be refined and tighter debtor control is to be exercised; the borrowing of the group is to be more rigidly fixed.

The philosophy of the company will still be of one of "management of change", bearing in mind the changes and fluctuations in the industry from year to year. The traditional "technical" approach will diminish and the group will become more profit-orientated; this reflects the influence of the Chief Executive as a business man, rather than an engineer. Closely associated with this approach, it is envisaged that the group will emphasize the marketing function in the construction industry.

Conclusion

The prevailing impression of Case Study A is that of a large forward-looking organisation which is attempting to reconsider the various problems associated with the industry and to gear the accounting information system to the needs of management at all levels.

(Note: The material in this case study had to be curtailed, due to the fact that the Chief Executive did not wish the Financial Director to divulge any additional information: this reticence tends to confirm the experience of one of the consultants.)

CASE STUDY B - A MEDIUM-SIZED CONTRACTOR

General Introduction

The head office of this company is situated in a well-known East Midlands city and its construction activities of roadways, housing and multi-storey buildings tends to be confined to the immediate locality, i.e. within 25 - 30 miles of head office; the number employed is approximately 300.

The Management and their accounting needs

(1) Higher management

There are eight members of the Board of Directors; two of these directors are members of the Institute of Builders, three are qualified accountants and the other three have no professional qualifications.

Every month cost details in respect of all contracts are given to the Directorate and the Board are generally satisfied with the information given.

(2) Site management

(a) Site Manager

The site manager (covered in the survey) is a Licentiate Member of the Institute of Builders and this fact can be considered typical in regard to the level of qualifications attained by site managers.

He is generally satisfied with the type and frequency of the accounting information he receives, i.e. contract costs/profits on a monthly basis; he is more interested when losses occur.

Within the limited activities of this company, i.e. houses and multi-storey buildings, the technical considerations of a contract tend to be less important to the site manager than the financial implications and the speed of execution.

(b) Site Foreman

The foreman, who is professionally unqualified, tends to rely upon verbal information given to him by the Site Manager; because of the nature of the industry he seems to be satisfied with this arrangement (see Appendix 19).

Tendering and Estimating Procedures

This medium-sized contractor has not been involved in the submission of dual-tenders: 18% of tenders are accepted - 20% in respect of houses and 5% in respect of multi-storey buildings.

Standard costs are not used for price-fixing of tenders as work study is not in operation. However, labour is paid on a contract basis, irrespective of time taken and, therefore, a degree of wages cost control is applied as the contract proceeds: unrefined historical costing data is used as the basis for calculations. (Published cost analyses are not used by this medium-sized contractor.)

There is extensive feed-back of information connected with current jobs to the estimating staff so that they are able to update their current estimates and also accumulate data for use in the calculations of future estimates.

Influence of the various organisations associated with the industry

It is contended that the extent of the influence of the various organisations is not extensive in regard to development of management accounting techniques in the construction industry.

The Accountant and the techniques in use by him

The accountant is professionally qualified and he has spent 25% of his working life in other industries. He sees his role as that of financial adviser, although much of his work is concerned with stewardship.

The technique of internal audit is applied throughout the accounting system and applies to both financial and costing records.

Marginal Costing (and Break-even Analysis) are frequently used in providing information which enables decisions to be made as to whether certain operations could be more profitably sub-let to other contractors, rather than performed by the company itself, viz. plumbing work.

Long-term Forecasting and Planning is used in order to maintain a (long-term) adequate stock of land.

In order to control the liquidity of the company, the technique of Budgetary Control is used over periods of one year.

(A balance between private and public contract work is considered vital; although bigger profits apply in the former, the cash flow is slow, whereas smaller profits in the public sector are offset by the quicker cash flow via regular payments.)

A refined system of Standard Costing is not used as it "would require too large a staff for the additional benefits accruing from it". However, as previously mentioned, (tendering/estimating procedures) standard labour (and material) costs - based on historical data - are used for contract "cost control", i.e. "standards" are used for guidance in relation to the prime cost inputs on the various processes - wages (via the contract system of remuneration) and material (via the bill of quantities). However, a detailed comparison of standard and actual costs - together with an analysis of variances - is not in operation.

The other management accountancy techniques of capital expenditure project assessment, internal ratio analysis and inter-firm comparison are not in use.

Additional Comments and Conclusions

In spite of the existence of accountants on the Board, the stronger influence of the technical directors is apparent; higher management is not accountancy-minded and this approach is reflected throughout the company. The essential role of the accountant is that of financial steward rather than financial adviser.

Geographical differences tend to accentuate the "division" between head office and site management although there is a growing awareness (at head office) of the significant contribution to be made by site management to the prosperity of the company. (There is conversely a feeling on the part of site management that it is expected to offset the inadequacies and inefficiencies of head office.)

However, the company is attempting to cement relationships by offering a bonus to site management, i.e. managers and foremen, based upon such factors as site profits, difficulties of project, cleanliness of site, co-operation, enthusiasm, time-keeping, etc.

This bonus scheme has been introduced in order to signify the importance of site management, e.g. it is contended that site foremen can either "make or break a contract".

Another possible future development is the circulation of printed sheets to foremen, in order to give more information on the project/contract in which they are involved and to stress areas in which the contribution of the foreman is vital to the efficient running and completion of the contract.

By way of general conclusion it may be stated that the defined needs of the company (i.e. as specified by higher management) are being met within the existing system. Any extension of the system would necessitate additional accounting staff and this is not thought to be a

viable proposition in terms of (actual) additional costs involved as compared with (possible) additional benefits to be derived.

CASE STUDY G - A SMALL CONTRACTOR

General Introduction

In the case of the small contractor, it is considered more appropriate and realistic (within the terms of the thesis) to use a hypothetical "case study" (included in Appendix 14) based upon the experience of a chartered accountant who has been concerned with many small companies in the construction industry.

In view of the fact that 96% of the firms in the industry employ less than 59 workers, this approach is deemed more accurate than using the information submitted by one of the few small companies which responded to the survey (Appendix 15); however, this case study is substantiated by these respondents and appropriate comments are included.

The small contractor is usually concerned with the construction of schools and houses, either as the main contractor or a sub-contractor. (Note: This size of company accounts for over 34% of the value of work done by the industry - see Figure 2.)

The Management and their accounting needs

(1) Higher management

The Contract/Technical Director is normally the working proprietor of the small company and it is unusual for him to have either professional qualifications or a degree.

On a quarterly (or completion) basis, he requires details of the following costs in respect of each contract:-

- (a) wages,
- (b) materials,

- (c) sub-contract costs,
- (d) plant hire, and,
- (e) professional fees, e.g. architects' fees.

This arrangement is satisfactory except for the delay which results from late submission of invoices by the suppliers of materials and services.

(2) Site management (i.e. Site manager and site foreman)

Neither the site manager nor the site foreman tends to be professionally qualified and the amount of accounting information needed by them is negligible; verbal instruction/information confirmed by written contract specification normally suffices. (One respondent indicated that weekly/monthly information on contract's physical progress would be useful.)

Although the financial implications are more critical in the case of the small contractor, the technical aspects are fully considered in the execution of any contract, i.e. by adherence to specifications. If any factor has to be demoted in the order of priorities, it will be a delay in the completion date of the contract.

Tendering and Estimating Procedures

The small company has insufficient staff to submit dual tenders apart from the fact that the procedure is not associated with house-building and school construction. Due to the degree of specialisation (and the experience of knowing whether or not to submit a tender) the percentage of tenders accepted by clients is over two-thirds (this percentage is relatively high due to the preponderance of speculative house building being included in the "tenders" accepted).

"Standard" costs are not used for price-fixing of tenders but some attempt is made to control cost (by reference to "standard" input

quantities) as the contracts proceed, i.e. more detail is developed once the tender has been accepted. However, work study measurements are not used by the small contractor; he uses the most frequently occurring cost of same/similar work. (By contrast, he does not make use of the various published cost analyses which seems rather unimaginative.)

Bearing in mind that the estimator is the owner of the small company, there is extensive feed-back of information and this is used by the estimator/owner for the revision of current estimates and guidance in the compilation of future estimates.

Influence of the various organisations associated with the industry.

The influence of the Construction Industry Training Board, the universities and the colleges of technology is not extensive in the small company, although the Institute of Chartered Accountants may contribute towards the development of management accountancy techniques through the influence of the company's auditor, as a member of his professional institute.

The Accountant and the techniques used by him

Small companies do not employ a qualified accountant, but rather an unqualified book-keeper/contract cost clerk. However, the company's auditor, who is essentially a financial steward, may also act as financial adviser and endeavour to persuade the proprietor of the small company to apply the more relevant management accountancy techniques.

In contrast to the extensive (external) statutory audit, the technique of internal audit is not applied in the formal sense, although the proprietor tends to check accounting procedures and accuracy in the normal course of everyday business.

Although conventional marginal costing is not used, the technique of break-even analysis is occasionally used in order to assess the cash requirements of a particular site/contract. This application may be due to the requirement of the company's bank, i.e. the break-even chart shows the estimated cash flow over a time-period so that the bank has some indication of security in relation to the requested overdraft facilities (see below - budgetary control).

The principle of long-term forecasting and planning is foreign to the small contractor and his thoughts on the subject are very vague. However, there is a limited application of this technique where it is necessary to formulate long-term (say 3 year) forecasts for the purposes of taxation and estate duty.

Some degree of budgetary control applies in the small company, particularly in the areas of site control and cash control. At site level, the original estimate acts as a budget (or standard site cost), and actual costs are compared with this figure in order to indicate inefficiencies, over-spending, etc. (alternatively "standard" can be expressed in terms of material quantities and labour times). In addition, sub-contractor costs are monitored against agreed work-measured standard costs (see Case Study D).

Cash budgets are also used in order to prevent over-spending by directors and also to calculate bank overdraft requirements; these may be necessitated by the acceptance of a relatively large contract (see above - break-even analysis), or when government pressure exists in relation to the extension of bank credit. (Note: One respondent which did not use cash budgets in such a situation has recently been declared bankrupt.)

Capital expenditure is not assessed by the small contractor, in fact, the working proprietor does not have the time to carry out more

than one or two of the aforementioned methods of control. In practice such expenditure is considered in the light of, e.g. labour availability, convenience, etc. and also it may be more economical to hire plant, particularly when the order book is fluctuating.

The technique of internal ratio analysis is one which is developing in the smaller company because it highlights to the proprietor the changes which are taking place from one year to another. A comparison of significant ratios has more impact upon the directorate/ higher management than the normal operating statement.

Mainly due to the intense competition for contracts in the industry, there has not been an extension of internal ratio analysis into the technique of inter-firm comparison for the small contractor.

Conclusion

In the smaller firm, the onus would seem to be on the statutory auditor/accountant to formulate a simple accounting system to satisfy the limited needs of the owner. The amount of written information directed to site management though not extensive, should cater for their requirements.

CASE STUDY D - A SUB-CONTRACTOR

General Introduction

The head office of this firm is situated in the East Midlands and it is a sub-contractor to the industry, mainly being concerned with the heating and air conditioning engineering associated with the construction of schools, houses, flats, hospitals, laboratories, etc. The firm has ten branches located throughout the U.K. and the total number of employees is in the region of 600.

The Management and their accounting needs

(1) Higher management

The director in charge of contracts has no professional qualification but his experience of the industry reflects in his appreciation of the relative significance of various reports, e.g. although capital expenditure is only indicated on a quarterly basis, he stipulates the need for a daily assessment of the liquidity position; contract information is formulated on a monthly basis.

Higher management tends to be dissatisfied with the type and frequency of the accounting information received and suggests that faster and more detailed information is necessary in respect of the various jobbing contracts. (As it is often difficult to fulfil both these requirements, i.e. speed and detailed accuracy, the accountant realises that some degree of "education" of higher management is necessary on his part and is hoping to develop his "Management Information System" (see latter part of case study). He visualizes the time when the accounting system will be computerized with the obvious use of terminal input from each site, but at this stage in development the cost/benefit approach would not make this a viable proposition.)

(2) Site management

(a) Site manager

The manager is usually not qualified but sometimes is a qualified heating engineer. His accounting needs are short-term and on a daily basis needs labour and materials reports (see "Management Information System"); monthly/weekly (depending upon the duration of the particular contract) he needs an indication of the progress of each contract. He would like to see a development of the existing accounting information in relation to labour efficiency in order to control actual labour input as compared with the standard labour costs

where they have been established.

In regard to the execution of contracts, it is contended that the time, finance and technical implications are inter-changeable as to their priority, depending upon the particular contract.

(b) Site foreman

The professionally unqualified foreman resists the idea of any written information; he only wants relevant verbal instructions. (The accountant agrees that there is a large 'education' requirement needed in this area if site management - manager or foreman - is to be really effective.)

Tendering and Estimating Procedures

The sub-contractor does submit dual-tenders but on an infrequent basis and some 20% of the firm's tenders are accepted. Obviously this percentage fluctuates according to the market, e.g. if work is plentiful more tenders are accepted by clients.

Standard costs are used from both a price-fixing and contract cost control viewpoint and have been calculated on a work study basis although they have not been recently revised; published cost analyses are not utilized.

There is an extensive feedback of information to the estimators in respect of current jobs and the information is used for both the current estimating of future contracts and for guidance in the preparation of future estimates; however, this is a recent procedure and does not work as effectively as the accountant and management require.

Influence of the various organisations associated with the industry

In regard to the development of management accountancy techniques in the industry it is felt that the various organisations

had little impact and had not encouraged the use of these techniques.

The Accountant and the techniques used by him

The professionally qualified accountant also acts as company secretary and essentially his role is one of financial adviser/
management accountant: 75% of his total working life to date has been spent in other industries and this possibly accounts for his refreshing approach to the problems associated with his position.

He was employed (some 2 - 3 years ago) to develop the recommendations of a firm of consultants; it was suggested that the previous historical costing approach should be discontinued and a system of budgetary control and standard costing substituted.

Throughout his period of employment, the accountant has stressed the "human element"; he has made personal visits to the various branches and sites in order to improve communications. In his own words he has tried to offset the general feeling amongst branch and site management that "they are like small boats allowed to paddle on their own in a large ocean".

The extent to which the accountant is using the various techniques will now be indicated.

Internal Audit is organised on a head office basis and is applied in two main areas (i) cash control and (ii) systems analysis. It is considered necessary to keep branch employees aware of their responsibilities in connection with cash and also it is hoped that technical and clerical staffs are made more fully aware of their interdependence through the internal audit of the estimating and associated procedures.

Marginal Costing is only used as a short-term technique in order to balance work-loads, e.g. special contract is accepted on

marginal cost basis where 80% of fixed overhead expenses are already recovered on normal contract work. (Break-even analysis is not used in the text-book style but the principles are employed in conjunction with marginal costing.)

Long-term Forecasting and Planning is not used but not because it is considered impracticable but rather in view of the fact that higher management has yet to be convinced of the benefits of objectivity.

Budgetary Control has been only recently initiated and therefore the benefits have not yet materialised. The "education" period concerning both higher and site management (including foremen) has not been long enough for the potential(s) to be fully appreciated; considering the fact that the management has no previous experience of the technique, it is not unlikely that its full acceptance may be delayed.

The technique of Standard Costing has been applied (on a "pilot scheme" basis) to all the contracts completed in one branch for the past twelve months with very positive results, although "education" of the involved personnel proved very difficult in the initial stages of installation.

The standard costs of labour (on a work study base) and materials is compared with actual costs in order to facilitate the degree of "efficiency" reached on the various contracts (and as reflected in the difference between standard and actual costs); this has proved exceedingly helpful (see previous paragraph on tendering and estimating procedures).

The amount of money involved in capital expenditure (as compared with revenue expenditure) is relatively low in this sub-contracting firm. However, when appropriate the projects are assessed

prior to commitment by use of the pay back method refined by the application of the discounted cash flow technique.

Internal ratio analysis has been developed and related to the scheme of inter-firm comparison carried out under the auspices of the Heating and Ventilating Contractors Association.

Insofar as the future is concerned it is hoped that the "Management Information System" (see later paragraph) will be developed alongside a scheme whereby both management and the labour force have their pay related to the attainment of their individual "budgets", via an annual pay review. (The present structure relates the bonus of an individual to the value of each contract on which he is involved.)

(Outside the strict limits of management accountancy techniques it was also intimated that the present acknowledged weakness of the marketing function would be strengthened.)

Conclusion

On a final note, it was intimated that stress in future would be upon the education of management as to the relevance of management accountancy techniques to the firm and in particular this education would be geared towards higher management: it was hoped that week-end meetings could be held in order to encourage maximum co-operation on the part of all levels of management and personnel. In the case of this sub-contractor, the enthusiastic accountant seems dedicated to the evolution and development of an accounting information system which contributes towards more effective management.

Management Information System (Summary)

Objectives

These are to provide:-

- (1) branch management with statistical information of the

weekly progress of all contracts to enable them to achieve maximum profitability from the resources of labour and material available,

(2) senior management with a comprehensive report of the progress of each contract so that decisions of policy can be formulated which may affect areas of the group's operation rather than just one branch, and,

(3) a detailed financial analysis of each contract so that a judgement may be made from the monthly reports of the profitability of each contract during its progress.

Type of contract to be included in system

Branch managers are responsible for deciding whether a contract should or should not become part of the system but they are given certain guide-lines, e.g. contracts in which work is likely to be completed in a month or where labour site hours will not exceed 300, should not be included (provided materials are not a significant factor in the value of the contract).

Schedules to be completed (for inter-relationships see Figure 32)

Schedule 1 Estimated Cost Sheet (Figure 24)

This form summarises the detailed costs prepared by the draughtsman in respect of each job/contract.

Schedule P Purchase Day Sheet (Figure 25)

This form indicates in terms of estimated cost the value committed by the company on each contract and also indicates the materials for which invoices have not been received.

Schedule 2 Contract Progress - Site Labour (Figure 26)

The main object of this schedule is to compare the actual and estimated labour costs; the branch manager receives this information each Tuesday morning and, therefore, has the opportunity to take quick corrective action if it is found necessary from the figures.

Branch:

TOTALS

152

CONTRACT PROGRESS - SITE LABOUR (S2)

Contract:

Branch:

Job No:

Week Ended:

JOB No. /SECTION	ESTIMATED COST (E)		ESTAB- LISHMENT EXPENSES	CHARGEABLE TIME-C				STANDING TIME-S				% Standing to Estimate (s ÷ e)	VARIANCE (E) - (C + S)		EXPENSES
	Hrs. (e)	Amount		(Hours)		(Amount)		(Hours)		(Amount)					
				Week	Total	Actual	Total	Week	Total (s)	Actual	Total		Hrs.	£ s d	

FIGURE 26

As the estimated labour cost includes both "chargeable" and an acceptable percentage for "standing time", it is important that actual times are analysed accordingly, so as to indicate to management the extent to and the nature in which actual labour cost is in excess of estimated; then remedial action may be taken if practical. Alternatively, future labour estimates may be revised in order to allow for any "unacknowledged" lack of productivity, expressed in terms of either excess "chargeable" and/or excess "standing time".

Variances are only extended when actual is in excess of estimated cost. (It was suggested to the Company Secretary/Accountant that favourable variances could possibly be shown in order to indicate areas for contract price reduction in periods of increased competition; he accepted this principle with the following proviso - "the indication of favourable variances is only likely to give management benefit if a job to be quoted is identical to one that has shown a favourable variance. Even then, because of different site working conditions, it is impossible to draw a conclusion from which a guide could be used for price reduction. Actually, the level of margins to be employed is usually ascertained from the current market".)

Schedule 3 Contract Progress - Site Materials (Figure 27)

This schedule is completed monthly and summarises the progress of materials on the various contracts.

Variances are only required to be inserted if materials invoiced exceed quoted (estimated) materials, i.e. the same procedure applies as in the case of labour variances and the percentage is calculated as follows:-

$$\frac{\text{Variance amount (£)}}{\text{Quoted material amount (£)}} \times 100\%$$

Schedule 4 Direct Labour Statistics (Figure 28)

This monthly schedule is designed to show total site hours (including "standing time") on the contract(s) compared with estimated site hours and also the cumulative actual wages paid.

Variances are expressed in hours and in percentages, i.e.

$$\frac{\text{Variance hours}}{\text{Estimated hours}} \times 100\%$$

Schedule 5 Contract Progress Report (Figure 29)

This monthly report of each contract brings together the progress of both labour and material so that management may view the total position.

An important column on this schedule indicates the total cash received to date from the client (and this amount can be compared with the cumulative actual costs on the contract).

Schedule 6 Contract Progress Summary (Figure 30)

This is a monthly form completed by head office containing a summary of those contracts for which orders have just been received, those in progress and those completed contracts which are awaiting invoice procedures. Completion dates are included in this summary.
(ex - Schedules 5)

Schedule 3 Site Supervisor's Report (Figure 31)

This report is a most important link in the chain of information from the site and details the sections of each contract under his supervision.

The "% completed" column must give a realistic assessment and is calculated as follows:-

$$\frac{\text{Actual hours to date}}{\text{Actual hours to date} + \text{time required to complete}} \times 100 = \% \text{ completed}$$

DIRECT LABOUR STATISTICS (S4)

Period Ended

BRANCH:

CONTRACT/ SECTION	ESTIMATED COST		TOTAL ACTUAL HOURS			VARIANCE		% STANDING TO ESTIMATE (s ÷ e)	REMARKS
	HOURS e	RATE	HOURS a	RATE	AMOUNT	HOURS v	% v ÷ e		
								As per Schedule 2. (S2)	

FIGURE 28

CONTRACT PROGRESS REPORT (S5)

Contract:

Completion Date:

Job No.:

Branch:

Total Contract Price £

Period Ended:

CONTRACT/ SECTION	E ESTIMATED COST £	A ACTUAL COST TO DATE £	T ESTIMATE TO COMPLETE £	(E-A) - T VARIANCE £ %	% STANDING TO ESTIMATE	DATE	APPLI- CATIONS O/S £	TOTAL CASH RECEIVED TO DATE £	MATERIALS RECEIVED	REMARKS
Labour Expenses										
Labour Expenses										
Labour Expenses										
Labour Expenses										
TOTAL Labour Expenses Materials										
TOTAL										

FIGURE 29

<div> <div>CONTRACT PROGRESS SUMMARY (S6)</div> <div>Branch:</div> <div>Period Ended:</div> </div>							
CONTRACT		Estimated Cost £	Actual Cost £	VARIANCE £ %		Estimated Com- pletion Date	REMARKS
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						
Quoted	Labour Expenses Materials						
	TOTAL						

FIGURE 30

SITE SUPERVISOR'S REPORT (SS)

CONTRACT:

JOB NO.:

PERIOD ENDED

CONTRACT SECTION	ESTIMATED SITE HOURS	ACTUAL HOURS TO DATE	TIME REQUIRED TO COMPLETE	% COMPLETED	REMARKS

Materials

Extra Materials

£

Sub Contracts:

Progress Report

Special Comments

Site Supervisor:

Date:

FIGURE 31

(The efficiency of the men on site depends upon the reliability, capability and availability of the supervisor; he is a most important link between higher management and the labour force and may comment in his report as circumstances dictate.) The inter-relationships of the various schedules and reports are detailed below (Figure 32):-

Inter-relationships of Schedules

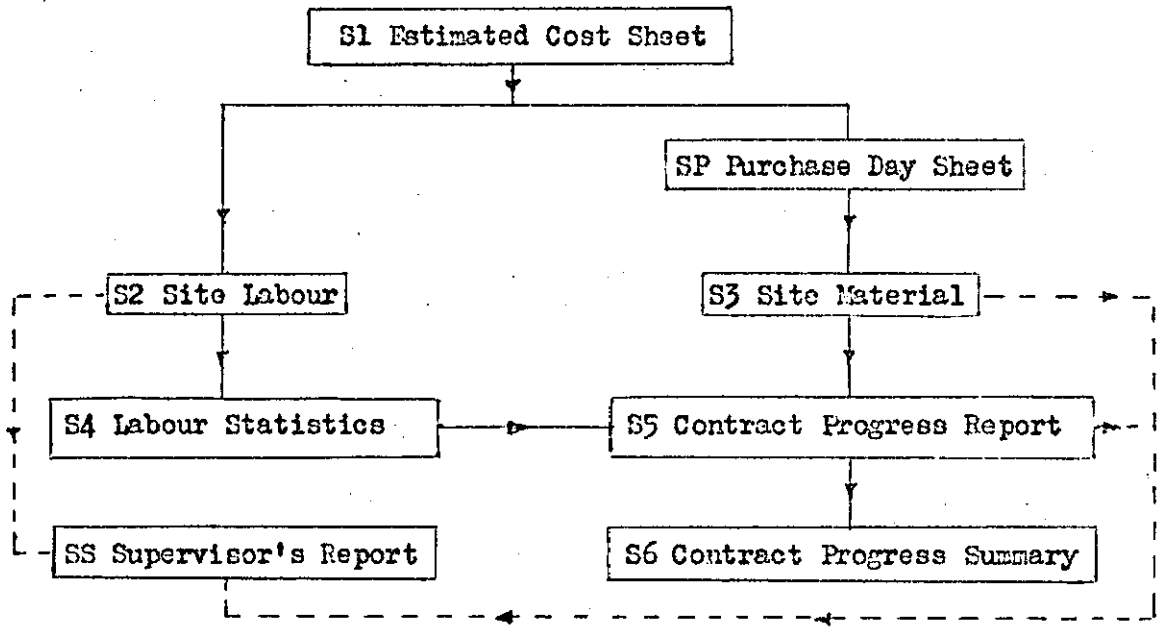


FIGURE 32

Postscript

The "Management Information System" was extended throughout the year (1969/70) to various branches within the company and had a good reception from both management and labour. As a result there was an increase in efficiency, i.e. "on average, 7½% on labour standard was realised": therefore, it was anticipated that the system would be further extended to cover the whole of the company by mid 1971.

CASE STUDY E - A SUCCESSFUL CONTRACTOR

General Introduction

Canada, Zambia, Germany, South Africa and the West Indies are some of the countries in which this international group company operates; these overseas companies are autonomous. The head office is situated in the U.K. and is concerned with the co-ordination of the group's activities.

The group has a complex range of activities including house building and the construction of roads, multi-storey buildings, tunnels, bridges, power-stations, dams and reservoirs, etc.

Numbers employed by this contractor (estimated by the Group Financial Accountant) are:-

U.K.	4,250
Overseas	1,500

The average group turnover figures for the two years 1968 and 1969 were over £31 M; the consolidated accounts for the period between 1964 and 1969 are summarised in Figure 33.

The Management and their accounting needs

(1) Higher management

The Director of Contracts (who is also the Deputy Chairman) is a Fellow of both the Royal Institute of Chartered Surveyors and the Institute of Quantity Surveyors. (The Chairman is also a qualified quantity surveyor but the accountancy profession is represented on the Board of Directors by a Fellow of the Institute of Chartered Accountants; the Secretary is also a Fellow of the Institute of Chartered Accountants.)

The Deputy Chairman is generally satisfied with the type and frequency of accounting information he receives, i.e.

- (1) weekly - overdue certificates

Case Study E - A Successful Company

Summary of Consolidated Accounts for period of six years

<u>YEAR</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
* Capital Employed (= C) (£'000)	2,976	3,151	3,302	4,136	4,563	4,751
† Group Profit Before Taxation (= P) (£'000)	476	529	595	778	910	1,083
† Profitability Index $\left\{ = \frac{P}{C} \times 100\% \right\}$	(a) 16%	16.8%	18%	18.9%	19.9%	(b) 22.8%
Overall Growth (in terms of Profitability)	$\frac{(b) - (a)}{(a)} \times 100\% = \underline{\underline{42.5\%}}$					

Notes.

*

Capital Employed includes -

Ordinary Capital

Reserves

Preference & Loan Capital

Deferred Taxation

Outside interests in Subsidiaries

- continued -

FIGURE 33

Notes.

As interest on loan capital has already been charged,
the profitability indices tend to be marginally conservative, e.g.

YEAR 1969

		£	
Group Profit Before Taxation		1,033,536	
add back Interest on Loan Capital		<u>15,920</u>	
		<u>£ 1,099,456</u>	(p)
Capital Employed (including Loans)		<u>£ 4,751,281</u>	(c)
∴ Adjusted Profitability Index	=	$\frac{(p)}{(c)} \times 100\%$	
	=	<u>23.1%</u>	(v. 22.8%)

Additional Footnote

In 1969, the Chairman became Britain's highest paid chief executive of a public company;
his gross emoluments were £75,345 (after tax = £12,465)

FIGURE 33 (continued)

- (ii) monthly
 - cash flow statement
 - sites/contracts reports, i.e. actual progress and costs on site compared with anticipated.
- (iii) quarterly
 - overhead analyses (e.g. cost v. absorption)

(2) Site Management

(a) Site Manager

The site manager (covered in the survey) is a member of the Institute of Builders and is generally satisfied with the type and frequency of the accounting information he receives, i.e. a weekly statement comparing actual site costs compared with estimated (anticipated) site costs and a monthly site/contract profit statement.

(b) Site Foreman

The foreman tends to be a first-class tradesman rather than be professionally qualified; written accounting information is not circulated to him and this arrangement seems acceptable.

Tendering and Estimating Procedures

Only occasionally is this contractor involved in contracts which create the opportunity to submit a dual-tender; however, the company is becoming more concerned with negotiated contracts (see Part II Section 2) and these represent approximately 25% of the company's work. (Nevertheless the view of the Chairman is that it is the competitive work which ultimately tests the contractor's ability.) An average of 20% of all tenders are accepted by clients.

Standard costs are used for the price-fixing of tenders (and the control of costs as contracts proceed) insofar as estimates based upon historical data are created for guidance in relation to bidding strategy (and cost control). In this context, the quantity surveyor

is in effect the cost accountant, i.e. he is accounting for the quantity input on the contract and, therefore, influences the projected costs related to those quantities, not only in terms of material, but also labour and other site overhead costs.

Where problems arise on current contracts, information is fed back to the estimators so that they are able to revise the current estimating of future contracts and also accumulate the information for guidance in the compilation of future estimates. As the group is profit orientated, the financial implications of any contract are considered to be of paramount importance.

Influence of the various organisations associated with the industry

The company takes full advantage of the various external courses organised by the Construction Industry Training Board, the professional institutes and the universities and colleges of technology.

The Accountant and the techniques in use by him

The accountant of this company is a Fellow of the Institute of Cost and Works Accountants and is both financial steward and financial adviser in his official capacity of Group Chief Accountant: he has spent 50% of his working life in other industries. He stresses that any information (accounting or otherwise) should be of use to management and therefore endeavours to apply the various techniques when they are relevant. (This view complements earlier discussion- see Part III, Section 1.)

The technique of internal audit is applied to all sites in order to substantiate both the accuracy of site records and the adherence to accounting procedures as required by head office. It has been developed in order to establish an effective and routine check on site staff, whilst creating another vital link between site and head office personnel.

Marginal costing is being developed in the subsidiary which manufactures tunnel machines but the technique has not been applied to the other activities of the company.

From time to time, break-even analysis is used for various levels of turnover in respect of the different companies within the group.

By the very nature of the contracting business, it is difficult to forecast but an attempt is made by the Chief Executive/Chairman to prepare 10 year long-term forecasts in the very broadest outline. (This fact should be considered as a natural extension of the increased stress on marketing within the group.) In addition, each company prepares 3 year forecasts of work-load and turnover.

Budgetary Control is used throughout the group and in certain areas has become highly specialised, e.g. cash control. The technique is also applied to those sites/contracts which may be relatively more difficult, i.e. where highly competitive tender necessitates extremely tight cost control.

Standard Costing is used by the company in the house-building activity and the technique is progressing rapidly in order to provide more effective information for management. (This technique is being progressively applied to all contracts, i.e. the establishment of a standard unit cost of different parts of a contract.)

The pay-back method is the one which is normally used throughout the group in order to assess capital expenditure projects. The alternatives (% original and/or average investment) are occasionally used either in place of or in addition to the pay-back method.

Discounted Cash Flow techniques are not normally used but all taxation and investment grant implications are studied in depth prior to any purchase of plant.

Internal ratio analysis is occasionally used throughout the group (say bi-annually) in order to measure the growth of each company and to compare one company with another.

The group, however, is not involved in any scheme of inter-firm comparison as it is felt that there are no comparable figures of use to management as the group is completely different from other construction groups.

The Company's Approach to the Accounting Information System:

Conclusions (16)

Over the past ten years this group has been the subject of a success story; in that time its sales turnover has quadrupled and its profits have multiplied nine times.

The group employs over 200 qualified engineers together with 19 qualified surveyors and one of the aims of the Chairman is to instil into them a financial and economic knowledge as well as their purely practical constructional skill.

Communications are very good and this fact pays a vital contribution towards the success of this contractor. Not only the accounting staff but the contract directors know and are known by all but the casual labourers on the sites for which they are responsible; this is the positive result of regular visits to the site by both directors and accountants.

(The responsibilities and the duties of both site management and commercial staff are clearly laid down, together with up-dated details of all procedures, within an official company manual.) This fact may be associated with the research findings of Dew and Gee who have stated (11) that "it was found possible for managers with relatively little experience of budgets to use them successfully, provided that the

accounting function was so operated that management accountants had close relationships with the managers and acted as interpreters of the information provided".

The higher management of this group are well aware of the need for the education and training of staff and send their staff to various external courses in order to give the participating managers an opportunity to see how the rest of the industry operates and to counteract any inbred tendencies towards isolationism. In addition, there has been a growth in the number of internal training courses held at the Group Training Centre; these are designed for site staff. All personnel are given encouragement to study for their appropriate professional or technical qualification.

The group's higher management is also aware of the need to appreciate management development and part of a system, initiated by the Chairman in 1964, is a bi-annual report by every manager on each one of his subordinates. The reports serve a dual purpose as senior management often learns as much about the writer as about the man he is describing. In addition, company procedures for section engineers lay down that they "must bear in mind that part of their duty lies in training their assistants"; managers at every level are expected to have one of their subordinates lined up and able to take over their job at a moment's notice.

Another contributory factor to the successful growth of the group is the increased marketing and sales promotion activities which have been brought under the control of the new director (sales); this position was created in 1969 and is at present filled by a 35 year old, the youngest director in the group. In spite of this change of emphasis towards professional selling in this construction group, the principle

applied to all contracts is that 'the best kind of advertisement is the job well done'.

The Chairman also has possibly been influenced by the conservative attitude of the accountants (at Board and higher management level) in relation to profit calculation.

Shareholders hear from him regularly, in one form or another, that "it is our practice to value work in progress at cost, less provision for losses and to bring into account profits on contracts only when they have been completed and all outstanding items have been agreed and settled".

In spite of a good profit record he argues that a better measure can be obtained from a four-year moving average; to quote from his statement for 1968 - "Shareholders will know of my preference for viewing the company's progress on the basis of a four-year moving average, as I believe this to be more appropriate to the type of industry in which we are engaged than is a judgment based upon the conventional accounting period".

"Our progress on this basis is as follows:-

<u>Period</u>	<u>Pre-Tax Profit</u> £'000
1957 - 60	202
1958 - 61	280
1959 - 62	359
1960 - 63	401
1961 - 64	430
1962 - 65	471
1963 - 66	513
1964 - 67	595
1965 - 68	703

This contractor is not alone in taking profits only on completion of contracts (Appendix 26); however, such contractors remain in a small conservative minority. (See Appendix 27 for short-term profitability comparison with well-known companies)

Alternatively, in the case of long contracts extending over a number of years, it is often advocated that a conservative estimate of the profit-to-date should be taken into the accounts (Formula and example - Appendix 28).

Future Developments and Conclusions

In spite of the success of the past few years, higher management hopes that further developments will be possible.

In order to more realistically quantify the labour content on contracts, it is hoping to influence a most general acceptance of work study techniques within the industry and ultimately within the group.

Contract directors and accountants will be encouraged to extend their visits to sites in order to create a team spirit between site and head office management and between the technical and non-technical staff.

The Chairman would also like to provide realistic rewards to the managers in the organisation and an incentive scheme, possibly based on the principle of Management By Objectives, is now being prepared.

As a result of reviewing the overall balance of operations and in particular the contribution necessary from other non-technical disciplines, two new members have been introduced into the higher management sphere. One of these will act as Group Secretary to lead and develop the Group Secretariat/Administration, and the other has been

appointed to make a particular study of all activities which involve investment of fixed capital.

Management techniques, including those associated with management accountancy, will continue to be used and developed whenever it is considered that they may help to make a positive and vital contribution to the success of the group; the aim of the Chairman will be to stabilise the group, putting future strength above present rewards.

Considering the prevailing "awareness" in the case of this successful company (as indicated in the earlier deliberations) it would again be presumptuous to add any further comment.

CASE STUDY F - A CONTRACTOR USING BUDGETARY CONTROL IN
CONJUNCTION WITH STANDARD MARGINAL COSTING

General Introduction

F (Contractors) Ltd. has its head office situated in Derbyshire: this "general contracting division" of F. Ltd. utilizes prefabricated units in the construction of schools, houses and various types of multi-storey buildings and as a result the offer of "construction packages" to its clients is facilitated.

The number employed by F (Contractors) Ltd. is in the region of 285, whilst the approximate number in the whole group (which includes head office personnel, a transport division, electrical contracting, traditional building, etc.) is 2,300.

Recent turnover figures are:-

F - Group	£10.5 M.
F - (Contractors) Ltd.	£1.5 M.

The Management and their accounting needs

(1) Higher management

The Contracts Director indicates a need for monthly information in respect of the various contracts on hand, i.e. a comparison of costs and value of work done, in terms of actual and "target" ("budget"/"standard"). (Monthly Operating Statements, e.g. III & VIII - Figures 37 & 42 - end of Case Study)

Higher management suggests that the various accounting returns should be available within a shorter time period and would also welcome an improvement in the technical input, e.g. some physical measure of work done to be indicated in terms of actual and "target".

(2) Site management

(a) Site Manager

The site manager usually has a Higher National Certificate (or its equivalent) and requires on a weekly basis, actual cost/value of work done comparisons in respect of:-

- (a) labour,
- (b) material,
- (c) plant, and,
- (d) site overheads.

However, as none of these figures is available, the site manager is dissatisfied; he feels unable to fulfil efficiently his responsibilities without such short-term (or long-term) accounting information.

In all circumstances, the order of priorities in regard to the execution of any contract are first - the technical considerations, secondly - the financial implications and thirdly - the speed of execution.

(b) Site Foreman

Most site foremen have a City and Guilds Technical Certificate (or its equivalent); similar to the site manager, the foreman is dissatisfied with the lack of accounting information available to him.

In order to contribute towards their greater efficiency it is suggested that weekly information should be forthcoming on labour costs, i.e. "simple statements are required showing the up or down situation on the principle labour operations; this could be supplemented by an overall running comparison of total actual costs compared with total 'standard' costs".

Tendering and Estimating Procedures

F (Contractors) Ltd. never submit dual-tenders; approximately 12% of the company's tenders are accepted.

"Standard" costs are used for both price-fixing and contract/site cost control; these standards are based on historical costing data updated to reflect the current price/rate framework, no reference being made to published cost analyses. *- is this a reference to unit rates / price*

Where it is considered necessary, there is occasional feedback of information in respect of current jobs to the estimating staff and this is used for both the current estimating of future contracts and for guidance in the preparation of future estimates.

Influence of the various organisations associated with the industry

Apart from the various Construction Industry Training Board courses which are available, it is considered that the professional institutes, universities and colleges of technology have had little or no influence in the development of management accountancy techniques in the industry.

The Accountant and the techniques used by him

The qualified accountant was previously with a firm of

professional accountants and his role in the company is essentially one of financial steward; the holding company (F. Ltd.) employs a Chief Management Accountant who acts in an advisory position for both F (Contractors) Ltd. and the other divisions in the group.

It is considered that the company is too small to employ the technique of internal audit.

However, marginal costing is applied to all sites/contracts in order to assess the degree of profitability expressed in terms of "contribution" (Monthly Operating Statements - e.g. II & VIII - Figures 36 & 42); break-even analysis is not used.

Long-term Forecasting and Planning is not used by F (Contractors) Ltd.; however, the policy of the group is to look ahead, although this is not formalized in the preparation of detailed long-term forecasts.

Budgetary Control is used extensively throughout the company; this application is facilitated by the use of a comprehensive cost codification system which covers both cost centres and expense classification (for examples - see Appendix 29 & 30 respectively). At head office level it is used as a management tool in connection with both cash control and control of Establishment Charges (see Monthly Operating Statement VII); at site/contract level it is used in conjunction with standard marginal costing (Monthly Operating Statements, e.g. VI & IX - Figures 40 & 43)

As previously indicated (under the paragraph - Tendering and Estimating Procedures), standard costs are used in the sense that estimates or "targets" based on past experience are created and are used as a basis for tendering and for creating standards/budgets for the various contracts and sites. (Where prefabricated units are used this procedure is facilitated but it is also being applied to a lesser extent

in the area of traditional building and construction work.)

As the investment in Plant and Machinery is considered insignificant, capital expenditure projects are not assessed by any method, e.g. pay-back, returns on original or average investment.

Internal ratio analysis is rarely used and then only within the context of an occasional involvement in inter-firm comparison; the latter technique is used by the company as a means of "assessing competitors' financial situations", e.g. liquidity.

Development of management accountancy techniques

In addition to the aforementioned, the chief management accountant of F. Ltd. has adapted the techniques of standard marginal costing and budgetary control in order to supplement the existing short-term accounting information for management. This particular development stems from the relationship between contribution and marginal (site) costs (= CM factor) and is concerned with the comparison of the actual and budgeted values of work done.

Calculation and application of CM factor

Example (Figures - Monthly Operating Statement III)

<u>Budget</u>		£
Value of work done (V)		50,000
Site Costs (H)		48,000
Contribution (C)		2,000
<u>Contribution</u>		2,000
Value	%	50,000
$\frac{2,000}{50,000} \times 100\% = 4\%$		

∴ Budgeted Contribution expected on actual work done

of £47,000 = 4% of £47,000

= £1,880

^H Note: This is usually known as the Profit/Volume (P/V) Ratio.

$$\begin{aligned}
 \text{CM factor} &= \frac{C}{M} \times 100\% \\
 &= \frac{\text{£ } 2,000}{48,000} \times 100\% \\
 &= \underline{\underline{4.17\%}}
 \end{aligned}$$

This CM factor is then applied to the actual marginal (site) costs in order to indicate the expected value of the actual work done,

i.e.

	£
Actual marginal (site) costs	45,500
add CM (4.17%) applied to £45,500	1,900
	<hr/>
∴ Expected value of actual work done	= £ 47,400
	<hr/>

This value of £47,400 may then be compared with the actual value of work done, as calculated by the quantity surveyor (= £47,000). It is considered important to assess the degree of accuracy attained by the latter, particularly in view of the criticism of higher management who advocate an improvement in the "technical input", i.e. it is vital to have a continuous comparison of actual and budgeted (standard) quantities involved on contract work, in terms of labour and material input, and reflected in the valuation of work done.

Future development and conclusions

Due to the recent interest shown in the various operating statements by site managers, it is anticipated that the degree of co-operation between the accounting and technical staff will increase. However, it must be recorded that such interest has only arisen since higher management has tended to measure financially the efforts of technical/site management as reflected in these monthly operating statements. (Figures 34 - 45)

P. LIMITED

MONTHLY OPERATING STATEMENTS - APRIL 1970

(Hypothetical Figures)

I	Balance Sheet	
II	Operating Summary	- All Classes
III		- Class 'A' Work
IV		- Class 'B' Work
V		- Class 'C' Work
VI		- Class 'D' Work
VII	Establishment Charges and Financial Expenses	
VIII	Contract Progress Statement	- Class 'A' Work
IX		- Class 'B' Work
X		- Class 'C' Work
XI		- Class 'D' Work

FIGURE 34

P. LIMITED

I - BALANCE SHEET

as at 30th April 1970

	<u>Actual</u> <u>30.4.70.</u>	<u>Budget</u> <u>31.12.70.</u>
	<u>£</u>	<u>£</u>
<u>Fixed Assets (Cost Less Depreciation)</u>		
Plant, Machinery, Tools, Fixtures	50,000	
<u>Current Assets</u>		
Stocks and Work in Progress		
Debtors and Prepayments		
Bank Balance		
	<u>300,000</u>	
<u>Current Liabilities</u>		
Trade Creditors and Accrued Charges		
Proposed Dividends		
Bank Overdraft		
	<u>100,000</u>	
<u>Net Current Assets</u>	<u>200,000</u>	
<u>Total Net Assets</u>	<u>250,000</u>	
<u>Represented by:</u>		
Issued Capital	100,000	
Unappropriated profit to 31.12.69.	140,000	
Profit for 4 months	1,400	
Corporation Tax payable 1.1.71.	8,600	
	<u>250,000</u>	

FIGURE 35

F. LIMITED

II - OPERATING SUMMARY - ALL CLASSES

(1)	<u>April 1970</u>		<u>Cumulative</u>	
	(2)	(3)	(4)	(5)
	<u>Actual</u> £	<u>Budget</u> £	<u>Actual</u> £	<u>Budget</u> £
Value of Work Done	142,000	145,000	525,000	590,000
Total Site Costs	137,000	138,700	504,000	565,500
<hr/>				
Total Contribution	5,000	6,300	21,000	24,500
Less Establishment Charges	3,000	2,700	10,500	10,800
<hr/>				
Trading Profit	2,000	3,600	10,500	13,700
Less Financial Expenses	600	550	2,500	2,400
<hr/>				
Net Profit	1,400	3,050	8,000	11,300
<hr/>				

FIGURE 36

P. LIMITED

III - OPERATING SUMMARY - CLASS 'A' WORK

(1)	<u>April 1970</u>		<u>Cumulative</u>	
	(2)	(3)	(4)	(5)
	<u>Actual</u> £	<u>Budget</u> £	<u>Actual</u> £	<u>Budget</u> £
Value of Work Done	47,000	50,000	145,000	150,000
<hr/>				
Site Costs:				
1. Materials, Purchases and Carriage	15,000		40,000	
2. Labour Costs (inc. N.I. H.W.P. Training, etc.)	12,000		40,000	
3. Hire of buses and personnel carriers	200		1,000	
4. Site supervisory costs	200		1,000	
5. Cost of Plant and Vehicles Used	3,000		10,000	
6. Incidental Site Costs	100		500	
7. Sub-Contract Costs	15,000		46,000	
<hr/>				
Total Site Costs	45,500	48,000	138,500	143,000
<hr/>				
	(a)	2,000	(a)	7,000
Total Site Contribution	1,500		6,500	
	(b)	1,680	(b)	6,780
<hr/>				

Notes:

(a) Original Budgeted Contribution.

(b) Budget Contribution expected on actual work done.

FIGURE 37

F. LIMITED

IV - OPERATING SUMMARY - CLASS 'B' WORK

(1)	<u>April 1970</u>		<u>Cumulative</u>	
	(2)	(3)	(4)	(5)
	<u>Actual</u> £	<u>Budget</u> £	<u>Actual</u> £	<u>Budget</u> £
Value of Work Done	25,000	30,000	100,000	120,000
<hr/>				
Site Costs:				
1. Materials: Purchases and Carriage				
2. Labour Costs (inc. H.I., H.W.P., Training, etc.)				
3. Hire of buses and personnel carriers				
4. Site supervisory costs				
5. Cost of Plant and Vehicles used				
6. Incidental Site Costs				
7. Sub-Contract Costs				
<hr/>				
Total Site Costs	24,500	29,200	97,000	117,000
<hr/>				
	(a)	800	(a)	3,000
Total Site Contribution	500		3,000	
	(b)		(b)	
<hr/>				

Notes:

(a) Original Budgeted Contribution

(b) Budget Contribution expected on actual work done.

FIGURE 38

F. LIMITED

V - OPERATING SUMMARY - CLASS 'C' WORK

(1)	<u>April 1970</u>		<u>Cumulative</u>	
	(2)	(3)	(4)	(5)
	<u>Actual</u> £	<u>Budget</u> £	<u>Actual</u> £	<u>Budget</u> £
Value of Work Done	20,000	25,000	80,000	100,000
<hr/>				
Site Costs:				
1. Materials: Purchases and Carriage				
2. Labour Costs (inc. N.I., H.W.P., Training, Etc.)				
3. Hire of buses and personnel carriers				
4. Site Supervisory Costs				
5. Cost of Plant and Vehicles used				
6. Incidental Site Costs				
7. Sub-Contract Costs				
<hr/>				
Total Site Costs	19,000	23,500	76,500	94,000
<hr/>				
	(a)	1,500	(a)	6,000
Total Site Contributions	1,000		3,500	
	(b)		(b)	
<hr/>				

Notes:

(a) Original Budgeted Contribution

(b) Budget Contribution expected on actual work done

FIGURE 39

P. LIMITED

VI - OPERATING SUMMARY - CLASS 'D' WORK

	<u>April 1970</u>		<u>Cumulative</u>	
(1)	(2)	(3)	(4)	(5)
	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>
	<u>£</u>	<u>£</u>	<u>£</u>	<u>£</u>
Value of Work Done	50,000	40,000	200,000	220,000
<hr/>				
Site Costs:				
1. Materials: Purchases and Carriage				
2. Labour Costs (inc. N.I., H.W.P., Training, etc.)				
3. Hire of buses and personnel carriers				
4. Site Supervisory Costs				
5. Cost of Plant and Vehicles used				
6. Incidental Site Costs				
7. Sub-Contract Costs				
<hr/>				
Total Site Costs	48,000	38,000	192,000	211,500
<hr/>				
	(a) 2,000		(a) 8,500	
Total Site Contributions	2,000		8,000	
	(b)		(b)	
<hr/>				

Notes:

- (a) Original Budgeted Contribution
- (b) Budget Contribution expected on actual work done.

FIGURE 40

F. LIMITED

VII - STATEMENT OF ESTABLISHMENT CHARGES & FINANCIAL EXPENSES

(1)	<u>April 1970</u>		<u>Cumulative</u>	
	(2)	(3)	(4)	(5)
	<u>Actual</u> £	<u>Budget</u> £	<u>Actual</u> £	<u>Budget</u> £
<u>Establishment Charges:</u>				
1. Audit Fees				
2. Advertising				
3. Bank Charges				
4. Director's Emoluments				
5. Depreciation (office fittings, etc.)				
6. Benevolent Fund				
7. Printing and Stationery				
8. Postage and Sundries				
9. Staff Pensions				
10. Professional Fees				
11. Rent				
12. Salaries				
13. Subscriptions				
14. Telephone				
15. Travelling & Entertaining				
16. Training (C.I.T.B.) Salaried Staff				
Total Establishment Charges	3,000	2,700	10,500	10,800
<u>Financial Expenses:</u>				
1. Interest Payable - Bank				
2. Directors Fees				
Total Financial Expenses	600	550	2,500	2,400

FIGURE 41

VIII - CONTRACT PROGRESS STATEMENT - APRIL 1970

			GRAND TOTAL TO DATE			THIS YEAR TO DATE			THIS MONTH				
# 1	2	3	4	5	6	7	8	9	10	11	12	13	14
<u>Class 'A' Work</u>													
Contract X	Dec.69 - Apr.71	400,000	70,000	3,500	3,000	65,000	3,000	2,500	17,000	700	600	330,000	50,000
Contract Y	Dec.69 - Aug.70	250,000	80,000	4,300	3,600	70,000	4,000	3,500	20,000	900	400	170,000	50,000
Contract Z	Apr.70 - Oct.70	150,000	10,000	500	500	10,000	500	500	10,000	500	500	140,000	5,000
									145,000	7,500	1,500	640,000	105,000

For legend
see Page 190

FIGURE 42

IX - CONTRACT PROGRESS STATEMENT - APRIL 1970

			GRAND TOTAL TO DATE			THIS YEAR TO DATE			THIS MONTH					
#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<u>Class 'B' Work</u>														
CONTRACTS SHOWN IN DETAIL AS VIII														
<hr/> 100,000 5,000 3,000 25,000 1,000 500 500,000 80,000 <hr/>														

* For legend
see Page 190

FIGURE 43

X - CONTRACT PROGRESS STATEMENT - APRIL 1970

			GRAND TOTAL TO DATE			THIS YEAR TO DATE			THIS MONTH					
#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<u>Class 'C' Work</u>														

CONTRACTS SHOWN IN DETAIL AS VIII

80,000	4,000	3,500	20,000	1,000	1,000	500,000	70,000
--------	-------	-------	--------	-------	-------	---------	--------

For legend
see Page 190

FIGURE 44

XI - CONTRACT PROGRESS STATEMENT - APRIL 1970.

	GRAND TOTAL TO DATE					THIS YEAR TO DATE				THIS MONTH				
#	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Class 'D' Work

CONTRACTS SHOWN IN DETAIL AS VIII

200,000 9,000'8,000 50,000 2,000 2,000 600,000 200,000

For legend
see Page 190

Total All Contracts: 2,240,000

FIGURE 45

LEGEND FOR FIGURES 42 - 45

- (1) Contract Detail
- (2) Duration of Contract
- (3) Contract Price
- (4) Selling Value of Work Executed
- (5) Budgeted Contribution
- (6) Actual Contribution taken
- (7) Selling Value of Work Executed
- (8) Budgeted Contribution
- (9) Actual Contribution taken
- (10) Selling Value of Work Executed
- (11) Budgeted Contribution
- (12) Actual Contribution taken
- (13) Selling Value at Date of Work to be executed
- (14) Payment Authorised to Date

(This is confirmed by the research carried out by Dew and Gee which gave rise to the statement that "the factor that was found to be most crucial in determining whether or not an item of (budgetary) information was used, was the extent of senior management following up on that information" (11))

In future, every attempt is to be made by the accounting services to orientate the information to the specific needs of technical management and it is hoped that relevant operating statements will be circulated to all interested parties and not just higher management as is the case at present.

Case Studies : conclusion

In view of the different types of firms (size and/or scope of activity) covered in the preceding case studies, it would be unrealistic to attempt a comparative analysis. However, it may be concluded that these case studies substantiate earlier observations contained in the thesis, i.e. the larger companies are making use of those techniques which will aid their management in the areas of problem-solving and planning and control. Although there is confirmation of the use of the techniques associated with management accountancy in the medium-sized firms, their development is not as extensive. In addition, although it would be incorrect to correlate success with the extensive utilization of the various techniques, it may be considered significant insofar as such utilization is likely to reflect an awareness and application of good management practices, e.g. forward planning, staff development, good communications.

By way of general conclusion it may be stated that the use of the techniques results from the accountant attempting to meet the information needs of management.

PART V

POSSIBLE DEVELOPMENTS OF THE MANAGEMENT

ACCOUNTANCY TECHNIQUES IN THE

CONSTRUCTION INDUSTRY

PART V

POSSIBLE DEVELOPMENTS OF THE MANAGEMENT ACCOUNTANCY

TECHNIQUES IN THE CONSTRUCTION INDUSTRY

Section 1 Introduction

If it is to stay in business, every firm must:-

- a) ensure completion of work to the satisfaction of its clients (i.e. in accordance with the agreed contract),
- b) maintain (and where possible improve) the desired profit on capital employed, and,
- c) have sufficient cash available in order to finance its various operations.

It is suggested that the introduction, maintenance, and where possible, development and modification of the various techniques of management accountancy can make a vital contribution towards the attainment of these objectives.

In fact it has been stated that "any contractor engaged in competitive bidding can increase his profits by applying a few simple, straightforward (new) management decision making techniques in his everyday business" (98).

However, before these techniques are individually considered in the light of their relevance to the construction industry, certain fundamental principles should be reiterated.

The accountant should act not only as financial steward but as financial adviser; where necessary he should be willing to interpret the financial implications of any information which results from the application of any management accountancy (or other) technique. This interpretative responsibility is best discharged by the design of

statements so as to emphasise important items for management; he may also state the various courses of action available in any particular situation.

In order to communicate the vital information to management, the accountant must combine well presented information with the ability to interpret in a logical manner; this communication objective may be typified by application of the following simple formula:-

$$\frac{PR \times IR}{100} = CR$$

where

PR = presentation ratio [■]

IR = interpretation ratio [■]

& CR = communication ratio

([■] Quantified assessment by the recipient of the information, e.g. contract manager)

(As a means of improving the presentation ratio, the use of graphical methods could be considered to a greater extent by accountants associated with the construction industry.)

By way of illustration, a firm's accountant may present information in a reasonably acceptable form (PR = 90) but his interpretative ability is rather limited and as a result he may confuse managers who are not "accounting orientated" (IR = 60). In consequence, the extent of the accountant's degree of communication is minimised (CR = 54%).

However, in the construction industry, where site management is geographically separated from the accountant (at head office), the need for "self-contained" information is extremely important. In this situation the value of a good accountant lies not with the accuracy of the figures he produces, but his ability to present them in such a way

that they are meaningful and can be easily and correctly interpreted by site management, without his assistance.

(The significance of the relationship between the accountant's role as an interpreter and the use of (budgetary) information has been studied by Dew & Rahim (105)).

Management at all levels must be kept informed, but the costs involved in the preparation of the various reports must be fully considered. "Higher levels of management will normally require reports that are broad in scope and from which the detail has been eliminated, so that only salient features are depicted. Information for lower levels of management should be progressively more detailed and related to functions which are more specialised in scope" (69), e.g. due to the existence of a high proportion of casual labour in the industry, details of idle time, absenteeism and labour inefficiency are particularly relevant.

The various techniques will now be considered as to their relevance to the construction industry; in addition this section will include a study of the extent to which these techniques may be developed and modified.

Section 2 The techniques; their relevance and possible development.

INTERNAL AUDIT

The chief aims of internal audit are to increase accuracy, detect errors of accounting principle and speedily detect and thereby prevent fraud.

Site Control

The relevant (and conventional) areas of application seem to be as follows:-

(a) Materials, e.g. the coding of purchase requisitions; receipts of material on site.

(b) Wages, e.g. bonus calculations; pay-out procedure.

(c) Plant Records, e.g. hire of plant.

It has been suggested (38) that auditing in a contracting firm covers the following areas of work:-

- a) orderliness of book-keeping,
- b) orderliness of cash management,
- c) interim and final invoice procedures,
- d) purchasing procedures,
- e) pay procedures,
- f) examination of cost control system,
- g) " " report procedures,
- h) " " stocks-on-hand,
- i) " " stock-taking procedures, and
- j) checking on observance of working instructions and areas of responsibility.

In addition, it is necessary to audit projects in order to re-appraise and influence future policy decisions, e.g. check the returns actually realised on an investment (18).

Organisation and Methods

This technique could be developed so as to become more closely associated with an "organisation and methods" approach, i.e. a "management audit" is envisaged which has a much wider base in that it considers a particular site/contract within a "corporate review". Accepting this precept, the "internal auditor" would have to be a more technical man because he would be required to study the resources being deployed on each contract; whether technical and financial objectives

have been clearly spelt out, whether the appropriate number of people with the necessary experience have been assigned to the contract and whether they have been/are making a vital contribution to its successful completion. (Alternatively, it has been suggested (13) that the management systems audit should be carried out by the auditors of the company accounts as they "should already be undertaking a large proportion of the work needed to reach a professional opinion on the management system".)

Information Audit

Alternatively (and in relation to the earlier introductory comments), it might be advisable to assign a senior member of staff as an "Information Auditor"; "some of the questions with which he would be concerned are:-

- a) how accurate is a piece of information, having regard to appropriate tolerances for the purposes required?
- b) is a piece of information too detailed and, therefore, too costly to produce for its purpose?
- c) is information produced in the right form and at the right time for its purpose, having in mind the inverse relationship between accuracy and speed?
- d) is the purpose of a piece of information fully understood and agreed between producer (accountant) and user (e.g. contracts' manager)". (14)

(Note: For a consideration of "marketing audit" see later section - Long-term Forecasting and Planning)

MARGINAL COSTING

Tendering

This technique (which differentiates between fixed and variable costs) operates when the price quoted for a tender is less than the estimated total value of the contract (including profit); this difference on any particular contract will be assessed by the contractor bearing in mind such factors as the need to keep in a market, the need to retain his labour force, etc. It may be more profitable to vary the mark-up according to the competition, i.e. a variable mark-up, based upon the amount of competition expected, will almost invariably result in higher profits than a constant mark-up.

Early in 1970, it was stated by the National Federation of Building Trades Employers, that due to shortage of work in the industry, many contractors were "buying it", i.e. under-tendering in order to hold on to work gangs which have built up in the prosperous years.

Such usage and development of the technique of marginal costing is only advocated for the short-term, particularly in view of the fact that the total profit margin on all contracts over a period of years must ultimately be related to the firm's capital employed. -
(Case Study E)

(As may be appreciated, the wider implications of bidding strategy are outside the scope of this thesis; however, in common with other competitive marketing situations it may be stated that one way of determining the probability of winning with a given bid lies in the studying of previous bidding data. As commented by a leading authority (31) - "where the results of previous bidding on contracts are announced, the 'bidding patterns' of potential competitors may be studied".

Complementary to the above it is suggested that the following statistics should be collected and evaluated:-

- a) number of tenders prepared,
- b) number of contracts obtained,
- * c) total value of tenders, and
- * d) total value of contracts.

* These may be (graphically) compared
with budgeted figures - see Appendix 32).

Interim Valuations

In F (Contractors) Ltd. (Case Study F), the chief management accountant uses the CM factor (i.e. contribution/marginal costs - expressed as a percentage) in order to indicate the expected value of the actual work done; this value is then compared with the actual work done as calculated by the quantity surveyor. It is suggested that an innate development of this approach would be to use the application of the CM factor as a substitute for the actual valuations; such a development would obviate the need for an actual valuation and completion of interim certificates by the quantity surveyor. However, as these certificates are used as a basis for interim payments to the contractor, agreement upon such a procedure would have to be reached by both parties. As a result, the rate of cash inflow could be increased and this fact would be advantageous to the individual contractor.

Example

Budget

		£
Value of Contract	(V)	500,000
Marginal (Site) Costs	(M)	480,000
Contribution	(C)	20,000

$$\text{CM factor} = \frac{C}{M} \times 100\%$$

$$= \frac{20,000}{480,000} \times 100\% = \underline{\underline{4.17\%}}$$

Periodic Valuation

Marginal (Site) Costs	=	£120,000
add CM (4.17%) to £120,000	=	<u>5,000</u>
∴ "Value" of actual work done	=	<u>£125,000</u>

Assuming the marginal (site) costs are available (as in Case Study F), the client could pay an interim amount of £125,000 - less an agreed sum in respect of contingencies (retention money). (At less frequent intervals than previously, a (measured) valuation could still be assessed by the quantity surveyor.)

Seasonal Costs

Insofar as marginal costing is a technique which differentiates between marginal costs and fixed costs (et seq. Part III), another development is in relation to winter construction costs (85).

If a contractor's output falls below what he can reasonably achieve then his fixed overheads are being wasted to a proportionate extent; he is also losing profit on the lost revenue. Therefore, he will find it worth spending up to an equivalent amount on winter precautions to restore full output.

(Note: The construction industry as a whole produces about 10% less during the winter than it does during the rest of the year. The Contractor should find, therefore, that in an average winter he can afford to spend up to 10% of his fixed overheads and profit for the winter period on winter precautions, if they bring his output up to normal.)

Example

(Estimates based upon an average winter, i.e. 16 weeks duration, including 4 weeks of severe weather.)

CONTRACT 432/7

Contract Value (V) = £250,000

Contract Period = 80 weeks

OVERHEAD & PROFIT CALCULATIONS

Estimated Fixed Overheads & Profit

(= 10% of V) 25,000

Site Overheads (foremen, hutting,
etc.) 5,000

Total = £30,000 ϕ

(ϕ = A fixed commitment in respect of costs and
return on capital employed)

\therefore Overheads & Profit per week = £375

add Internal Plant Charges
(weekly) £25

Total per week (excluding
guaranteed weekly wages) £400

\therefore in normally inclement weather, the "cost" of not taking
precautions would be £ 40 (i.e. 10% of £400 = loss of potential profit).

COST OF PRECAUTIONS

Floodlighting - installation
and running costs 150

Polythene wood-framed cover 130

Tarpaulins 220

Heating (for 4 weeks) 30

Sundries (hessian, etc.) 40

Costs (for 16 week period) = £570

\therefore Cost per week = £35.6

SUMMARY OF COSTS (WEEKLY)

Not taking precautions	=	£40
Taking precautions	=	£35.6

Break-Even Analysis

The graphical presentation of fixed and variable costs compared with sales revenue, may be modified in the following ways by the construction industry.

General application

A chart (Figure 46) may be created which indicates costs and revenues related to either man-weeks or number of houses, whichever is more appropriate. The chart indicates the number of structures (in man-weeks) to be built (and sold) before the company "breaks-even" (= B on chart). Depending on the state of the market, once this break-even point is attained, the building contractor may prefer to become more selective in his bidding on new contracts for the remainder of his fiscal year.

Any decrease in the normal work year (from $X - Y_1$ to $X - Y_2$) will increase the proportionate position of the break-even point; conversely, any increase in the work load (from $X - Y_1$ to $X - Y_3$) will decrease the proportionate position of the break-even point, thereby increasing the margin of safety. (Within this context, weather conditions may be a contributory factor.) Where construction is quantified in the manner indicated (e.g. $Y_1 - Y_2$), such a chart may be used to advantage by higher management.

Contract Profitability

Each contract may become the subject of a break-even chart (Figure 47) whereon the contract's budgeted costs and revenue can be plotted. Such graphical presentation will high-light in advance the periods when capital will be required (e.g. A); as previously considered

Break-Even Chart

A "Construction" Company

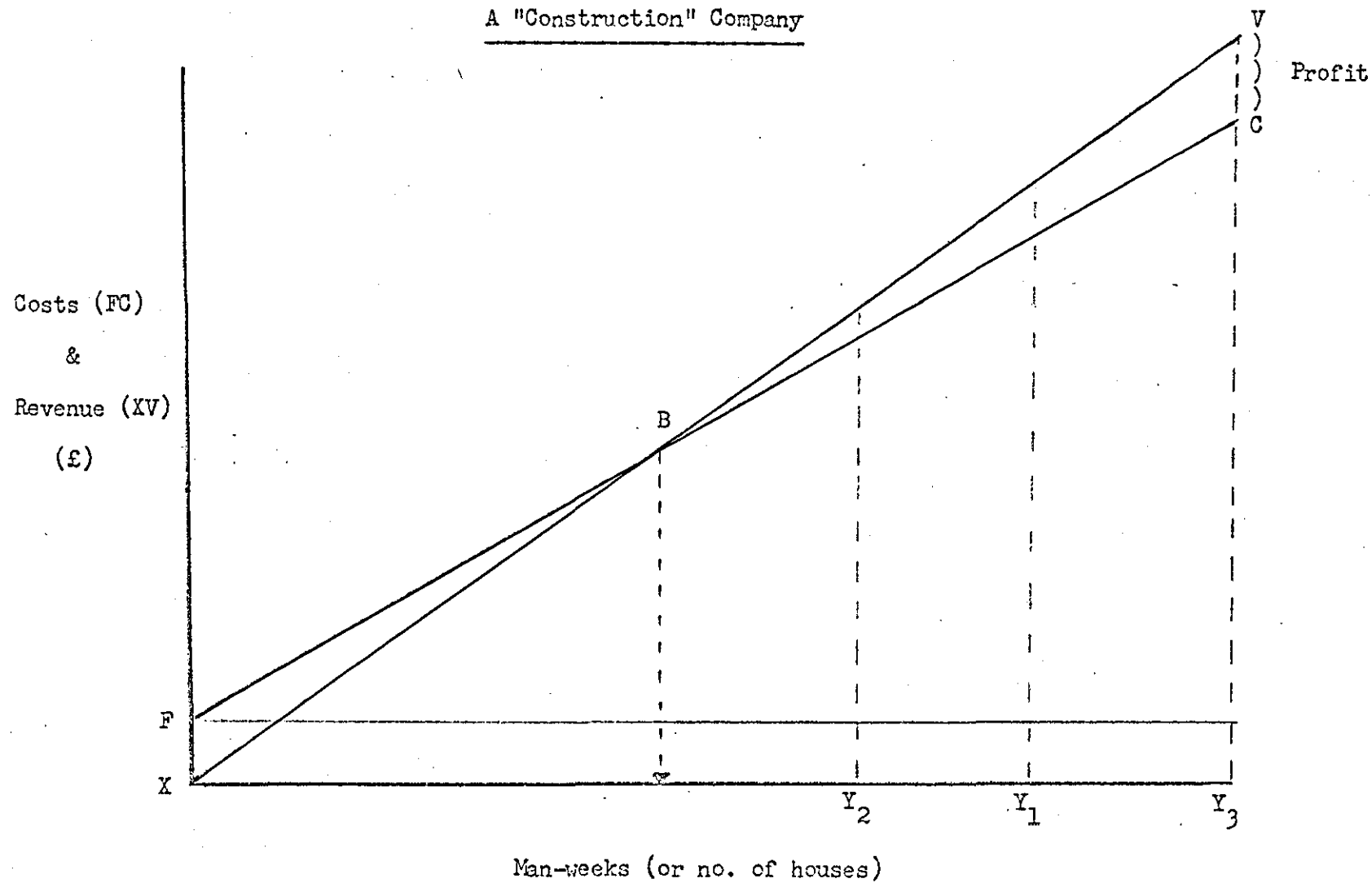


FIGURE 46

Contract Break-even Chart

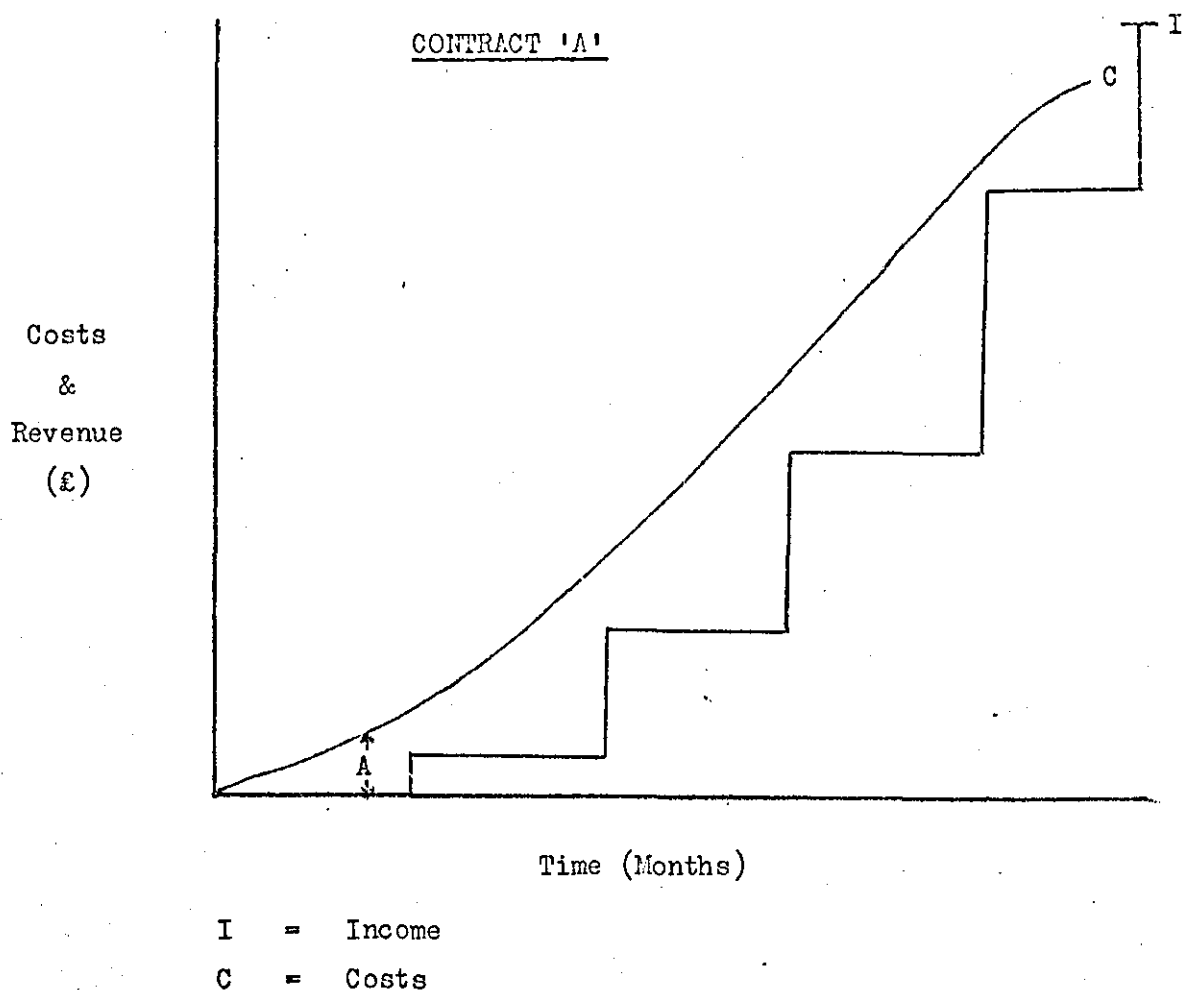


FIGURE 47

the question of liquidity is very important due to the nature of construction work.

On such a graph may be super-imposed the actual situation, in terms of costs and revenue. Any ensuing comparison can be considered against the background of "contract control", i.e. "that process of measuring the actual progress made against a "standard" programme, and to adjust the use of the various resources so as to reach the optimum solution (within the terms of cost and time) bearing in mind the various modifications which are likely to occur in many construction contracts".

(103)

(Complementary to the above is the need to graphically present the relationship of one contract to another on a time scale, bearing in mind the importance of continuity of work-load and the resultant need for cash resources (Figure 48 & Appendix 31). Every attempt should be made to dove-tail the various contracts so that resources are not over-loaded, although payments on account alleviate the problem.)

Consideration of Alternatives

Projects using alternative materials/structures, with varying degrees of necessary maintenance, may be compared by a development of the break-even technique.

Example

It is found that two types of construction are feasible in relation to a proposed block of offices (estimated life of 20 years); the comparative fixed and variable costs are indicated (Figure 49).

Up to a period of six years (= P), type B is more expensive than type A; thereafter type A becomes progressively more expensive because of the relatively higher cost of maintenance. (The architect should advise the client accordingly, the contractor adhering to the agreed specification as indicated in the Bill of Quantities.)

Notes: (a) These various types of break-even charts will tend to be presented together with numerical data in the practical situation.

(b) the limitations, e.g. regarding the linear presentation of costs and values must be fully explained by the management accountant, (previously discussed in Part III)

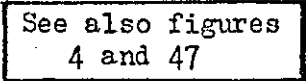


FIGURE 48

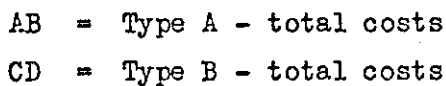


FIGURE 49

LONG-TERM FORECASTING AND PLANNING

Although there would seem to be less opportunity for the development of this technique in the construction industry because of certain inherent factors, e.g. the possible discontinuance or delay of long-term government contracts, certain facets should be considered within the context of long-term forecasting and planning.

Marketing and Market Research

If long-term forecasts and plans (for say 3 years) are to be a viable proposition for the construction industry, it is imperative that more firms become "marketing" orientated in the sense that "the marketing function brings the goods or services which a business wishes to sell to the attention of the markets to which it wishes to sell" (37). Market research (which concentrates on a specific market) may also be undertaken, either by the individual business, or, where it can be done more effectively, by an agent. Examining records kept by the business and data published by government departments, economic and business periodicals and economic and research organisations will aid the development of long-term forecasts and plans because such a study will indicate both the market potential and the extent to which the individual business is in a position to take advantage of the changing environment in their particular sphere of the industry. Statistical analyses should be undertaken and the creation of econometric models considered (see later section on model building).

(At this point it may be appropriate to quote the director of a firm of construction management and marketing consultants who was approached regarding this facet of the research undertaken - "The present attitude of the industry is negative. Although some companies have a marketing department usually concerned with sales promotion and

very occasionally with market research, very few companies adopt an adaptive approach to organisation which is essential if there is to be a continuous match between resources and market opportunities".)

Marketing Audit (120)

A marketing audit is a special type of audit in which the accountant can apply his objectivity and help serve a most useful purpose.

Marketing audits are essentially supplementary means of control, rather than primary, but their use results from the need for human application to instructions, in the light of plans and company policies.

"Misunderstandings of the nature of marketing audits probably account for their limited use: it must be emphasised, therefore, that they can help correct difficulties and improve conditions that are already good (acceptable)." (96)

Such an audit may be defined as a systematic, critical and unbiased review and appraisal of the basic objectives and policies of the marketing function and of the organisation, methods, procedures and personnel employed to implement these policies and to achieve those objectives.

Two types of marketing audit exist:-

(i) the vertical audit, concerned with a specific marketing activity (e.g. advertising), and,

(ii) the horizontal audit, representing an evaluation of the balance of the various marketing activities - the marketing mix audit.

As the latter is far more comprehensive and involved than the former, it is rarely attempted, as this horizontal approach is concerned with optimising the use of resources, thereby maximising the total effectiveness of marketing efforts and outlays; it is in this particular

area that the accountant can make a valid contribution (in addition to the overall financial assessment as to the viability of any long-term forecast and plan formulated as a development of this orientation towards marketing within the business).

Management should ensure that no areas of marketing go unevaluated; every aspect should be evaluated in accordance with standards that are compatible with the success of the marketing organisation and of the business as a whole. This, of course, requires that all activities be related to specified objectives (these in the shorter time period will be reflected in the policy-based budgets to be used within the context of the technique of budgetary control).

In conclusion, it must be noted that the inadequacy of the marketing function is being recognised; this growing awareness could have been a significant factor in the establishment of a new record for overseas contracts in the year ended March 1970 -

	£.M
(a) 1968/69 (= Record Year)	234
(b) 1969/70	341
Increase between (a) & (b)	45.7%

(M.P.B. & W.
1970)

In addition, the Institute of Marketing is in the process of forming "Industry Groups"; the purpose of such a group is to identify itself with the practical marketing problems of the particular industry. One of the two groups being formed is a Building and Construction Industry Group. (There also exists within the Industrial Marketing Research Association, a Construction Industries Section.)

In Case Study A (Part IV - Section 5), the marketing function is co-ordinated by the Director (Marketing); he decides the level of

advertising in relation to the amount of firm, anticipated and possible orders and is also concerned with market penetration. Also in Case Study E (Part IV - Section 5) there has been a recent change of emphasis towards professional selling in the group.

By becoming "marketing orientated", the business should be able to foresee adverse or favourable market trends, thereby projecting more accurate long-term forecasts and plans which will enable it to deploy its various resources in the most economic manner within a relatively controlled time period.

BUDGETARY CONTROL AND STANDARD COSTING

Although these two techniques may exist as separate entities and are being used (in varying degrees) within the industry, it is considered desirable to establish a clearer relationship between them; therefore, their joint development will now be examined (see Figures 50 & 51 for simple diagrams indicating the suggested inter-relationships: this will be elaborated during the development of this particular section when the facets of planning and control will be considered).

Budgetary Control

Head Office Costs (including required profit related to Capital Employed).

These costs, e.g. management salaries, will tend to be fixed in character and will be the subject of various departmental budgets, e.g. accounts department, marketing department. (Although reflecting the policy of the business, departmental managers should be involved in the preparation of the budget which is related to their individual area of responsibility: however, it will be necessary to stress the connection between one budget and another in order to co-ordinate the efforts of management.)

It is suggested that such costs should be apportioned to the

INTER-RELATIONSHIP BETWEEN BUDGETARY CONTROL
AND STANDARD COSTING

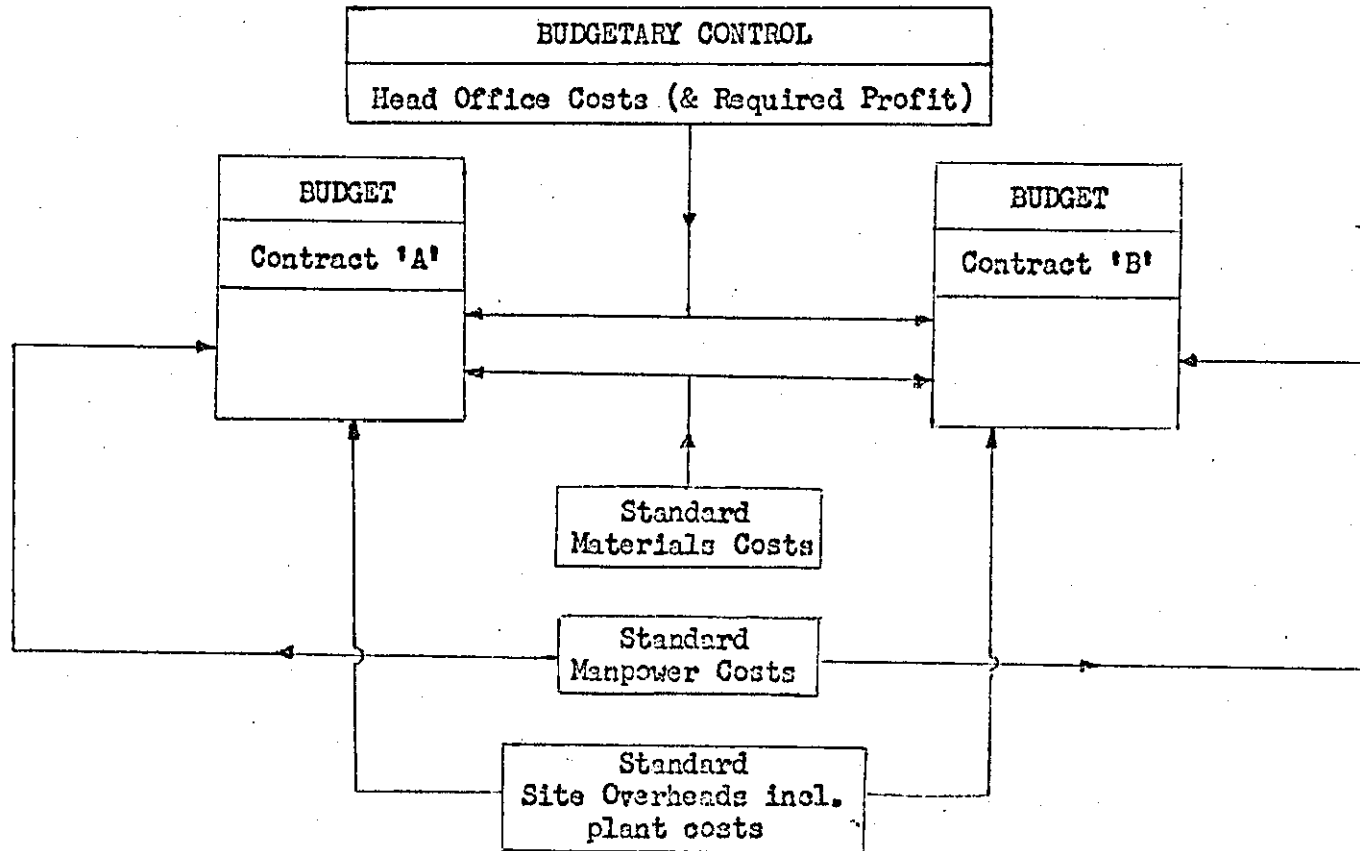
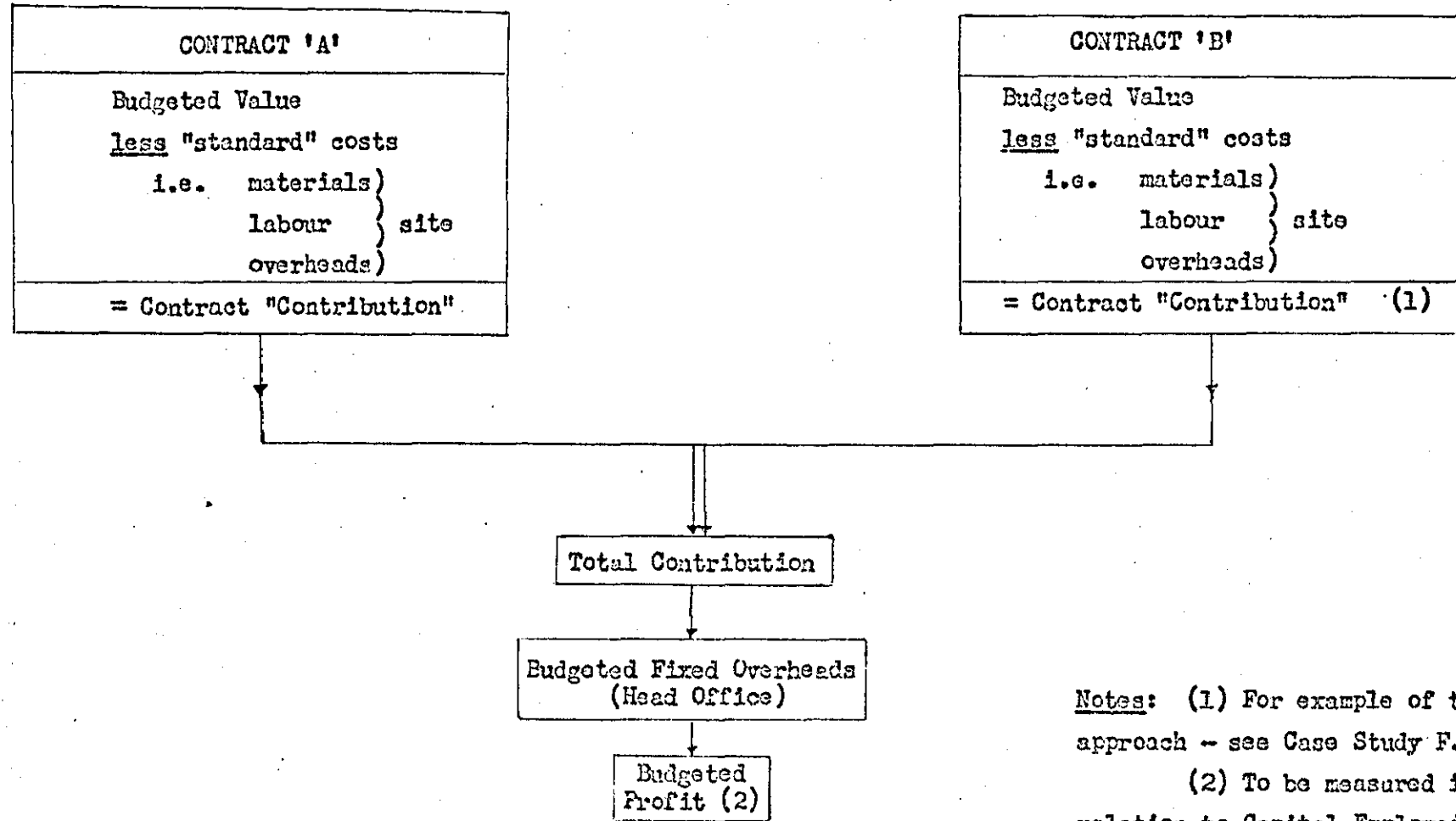


FIGURE 50

ALTERNATIVE "MARGINAL COST" PRESENTATION



Notes: (1) For example of this approach -- see Case Study F.

(2) To be measured in relation to Capital Employed -- see Case Study E.

FIGURE 51

various contracts in proportion to the budgeted duration of each contract expressed in man-weeks. (Alternatively, such "Head Office" costs may not be processed in this way - e.g. Case Study F - where "contributions" (towards fixed costs and profits) are extracted in respect of each contract.)

Example

Company XYZ

Head Office Costs = £500,000 p.a.

Contracts for year

	<u>Contract 1</u>	<u>Contract 2</u>
Period	March - October	November - February
Duration (in weeks)	30	20
Labour Force	400	300
Man-weeks	12,000	6,000
Apportionment of Head Office Costs	£400,000	£200,000

In large dispersed organisations, budgets are utilized in order to obtain a view from head office "of the forecasts and aspirations of their various divisions and groupings and to obtain a consolidated picture of their financial requirements" (108). A similar pattern emerges in the case of the contractor who is involved in sites in different geographical areas, although it is appreciated that any "forecasts and aspirations" will be related to the tender price of the particular contract; this aspect will be developed at a later stage, i.e. when the construction of a contract budget for the basis of tender and also site control is being considered.

Cash Control

In the construction industry, the need for cash control is reflected by the indication of actual use (see Appendix 23). However, the technique should be developed to a higher degree in the small business, particularly when it is appreciated the extent to which inefficient cash control contributes to the possibility/probability of bankruptcy. (Of the 4,369 businesses receiving orders under the Bankruptcy Act in 1969, it is significant that 957 (21%) were in the construction industry: Board of Trade Annual Report.) It is, therefore, imperative that a comprehensive yet simple budgeted cash flow statement be introduced by the small contractor and used on a regular basis (Appendix 31). By anticipating cash shortage(s), the contractor may be able to obtain short-term finance to cover the critical period(s); because of the risk element in the industry, it is also advisable to allow for contingencies - sometimes called a "tactical reserve".

Professor E.G. Trimble of the Department of Civil Engineering agrees with many of the aforementioned suggestions; he is of the opinion that "in an industry in which bankruptcies abound, cash flow forecasting should be undertaken in every company. In fact it is very rare that meaningful attempts are made". (However, he is undertaking some new developments in this field, i.e. the development of a computer programme to facilitate the more accurate forecasting of cash flow by inter-relating the cost and time factors of each contract, the shape of the value curve, payment arrangements (between client and contractor and contractor and sub-contractors/suppliers), etc.

Standard Costing

It is suggested that there is a great degree of scope for the development of this technique in the areas of tendering and site control.

G.F. Carr (25) agrees with the hypothesis that it is possible to develop a bill of quantities which gives separate standards in respect of labour, materials and plant for each construction operation. This proposal is based upon a new type of bill of quantities - the operational bill - which was originally developed by the Building Research Station (1964). This type of bill is prepared direct from the drawings for the purpose of obtaining competitive tenders and it presents the required information in an entirely new manner; by so doing, it is anticipated that the sensitivity in regard to cost control would be increased.

Operational Bill

The Operational Bill is an entirely new form of tender document wherein the work to be carried out is analysed into operations, processes or stages of work; these become the units for estimating (and later pricing) labour content. In addition, details are included of all materials and plant necessary to complete each of the aforementioned "packages of work". (In traditional bills of quantities, materials and labour are measured in accordance with the Standard Method of Measurement - see Appendix 2).

It is argued that certain advantages would accrue, although the disadvantages will not be precluded in the following exposition. From the viewpoint of the quantity surveyor, G.F. Carr (25) concludes that the completion of an operational bill of quantities "would take no longer than a traditional one". However, should he be required to produce a critical path diagram (which when used as a development of an "operations precedence diagram" (see Appendix 34) facilitates the preparation of the bill) it might prove necessary to charge an additional fee. (It should be noted that 80% of quantity surveyors

who have been involved in such preparation have completed the appropriate diagrams within the normal scale of fees (70)).

"The preparation of cost analysis information from operational bills is much simpler" (25); this fact is another advantage of these bills when increasing emphasis is being placed on both cost analysis and cost planning. When a tender is received which is higher than was anticipated, a reasonably quick examination of the priced bills would spotlight the high cost operations, indicating in which areas cost savings should be attempted.

In connection with any interim valuations (for payments on account), it would only be necessary to determine (and agree with the client's representative) which operation had been attained and finished; the value would then be the cumulative total up to that particular operation. Speedier payment should result from this approach, to the advantage of the contractor.

(The Central Electricity Generating Board encourage the application of the technique of "budgetary control" amongst the contractors concerned with the Board's projects; their intention is to ensure that payments are made on the basis of physical achievement. Financial values are assigned to the elements of a physical programme and contractors are paid when they have submitted the necessary detailed analyses (27)).

One disadvantage concerns the lack of information available in regard to labour as the wage element will have to be calculated to suit every particular contract. As work study has not been applied to any great extent in the industry, historical cost records (if available) will have to be used as a basis for calculating the "standard" labour cost. The inherent constraint is due to the lack of this historical data at the present time in the form required for completion

of "operational" bills; application of this approach will necessitate the accumulation of such data in a revised form. However, over a period of time, as more details become available it may be possible to calculate a "standard" labour cost based upon a historical mode, i.e. the most frequently occurring historical cost of same/similar work. (For another alternative see Appendix 33).

This type of operational bill would appear to place more work on the estimating department of the contractor; "the time taken to prepare an estimate for the project in question was about twice that which would have been required with traditional bills" (25). This is countered by the suggestion that experience would tend to reduce this estimating time.

Where possible, it is advocated that plant costs are detailed; when plant is likely to be under-utilized because of a gap between the operations necessitating the use of the plant, this fact is spotlighted (e.g. by way of horizontal bar charts) and the information may guide management decision in regard to the comparison between purchase and hire of such plant and equipment (i.e. control before event, rather than after).

The site foreman seems to be in a better position insofar as site control is concerned by the development of these bills as they help him to solve a large proportion of his problems. "From the order of operations (or network analysis ²⁶) he can ascertain without difficulty the next sections of work to be commenced and from the bills the nature and extent of his labour, materials and plant requirements for this work. He can thus ensure that all resources are requisitioned (or ordered) in sufficient time to avoid delays in construction" (25).

(²⁶ Although outside the scope of the thesis, it is appreciated that Network Analysis has been used in programming design and construction for the past 15 years; however, its application to the various pre-

contract procedures has only been attempted in recent years (29)).

In a situation where these operational bills were to operate, it would be necessary for the architect to prepare a complete set of drawings prior to the preparation of the bills; this approach seldom exists in the traditional procedures of the U.K. industry and the extra work involved could be costly and therefore considered to be disadvantageous. (For an elaboration of this view together with a comprehensive critical appreciation of Operational Bills see (71)).

However, architects are often blamed for poor communication in the industry and it is said that they seem to want to be isolated from construction issues; it is possible that the conventional bill of quantities is one cause and the operational bill could be the means of effecting a solution to the problem.

Although only marginal savings are indicated (25), it would seem that after an initial delay, contracts will tend to be more quickly completed (due to lack of delays as the contract progresses) and this will be welcomed by most clients.

The use of these operational bills of quantities would seem to be particularly appropriate to the negotiated contract at present, although development within the industry could extend the range of application into the sphere of competitive tendering. (Of the quantity surveyors participating in a recent survey (70), 15% have prepared operational bills, 12½% in connection with negotiated contracts and 2½% in open tendering situations.)

Alternatively, the "half-way" house advocated by the Building Research Station, might be of more immediate advantage, i.e. a bill incorporating the production bias of the operational background without necessitating detailed drawings but retaining the familiar standard methods of measurement and pricing using unit rates; these intermediate

bills were originally called "Activity Bills" but are now referred to as "Bills of Quantities - Operational Format" (93). (For a fuller description of these two forms of bill see 87.)

A visit to E.R. Skoyles at the Building Research Station substantiated the view that either approach will involve the complex construction industry in a process of re-orientation and such a change is not envisaged in the foreseeable future: although no growth in the use of operational bills is anticipated, a general increase in the use of activity bills is considered to be a reasonable supposition.

However, notwithstanding these reservations, the "new" type of bill will now be considered as a basis for the introduction of standard costing and budgetary control in an attempt to investigate the possibilities. It is appreciated that any such projection must be seen together with complementary research into, e.g. classification of tasks, collecting of performance data in relation to these tasks and testing whether the observed level of variability is sufficiently small for control purposes.

The Operational Bill as a basis for Standard Costing and Budgetary Control

The traditional Bill of Quantities (Appendix 2) is not a satisfactory basis for standard costing and budgetary control because the conventions of measurement and assessment are totally different as between estimator and accountant. However, with the possible advent of the operational bill, the tender completed in this alternative manner could be used as an effective instrument of "standard costing" associated with budgetary control: this suggestion now to be discussed, will elaborate upon the general application (see previous diagrams - Figures 50 & 51).

Procedures

Outline of procedures

- (a) Define scope of the contract,
- (b) define the various operations (and their sequence),
- (c) calculate the "standard" costs of these operations,
- (d) construct a "budget" (= total of all "standard" operation costs + apportionment of budgeted head office costs) in respect of each contract -
 - (i) as basis of tender, and
 - (ii) as basis of site control,
- (e) extract each contract's actual costs (related to the various operations [■]) on (say) a monthly basis,
- (f) compare (d) & (e),
- (g) analyse the differences (variances), and,
- (h) take appropriate action (where possible) to eliminate their perpetuation in future contract periods.

■ Note: In addition, the degree of analysis will attempt to reflect areas of responsibility within the construction activities.

Development of procedures

a) The scope of the contract

This must initially be agreed upon by the client and architect, the latter completing final drawings prior to the preparation of the (operational) bill of quantities.

b) The Work Operations and their sequence

The operations (or tasks) should be designed "for small gangs to perform over not more than three days' duration; the gang size, trade-labour ratio and man-hours allowed all being clearly stated. Each operation should also be supported by a Method statement describing the

routine and listing the plant and equipment to be used and the materials to be built into the structure" (60). This view in regard to a Method statement is likely to be challenged insofar as it tends to be the responsibility of the contractor as to how a building should be constructed.

In the industry, the tender can be regarded as the objective for a particular contract; if its costs are to be controlled efficiently the work must be analysed into these constructional elements which reflect the types and methods of operation, e.g. excavations, foundations, etc.

Insofar as the sequence of operations is concerned, the use of a precedence diagram (Appendix 34) (possibly developed into a critical path schedule) not only facilitates the preparation of realistic "standard" operation costs (by detailing time factors in relation to cost factors), but indicates the inter-relationship of the various operations within any specific contract: an appreciation of the effect of delays and interruptions is also facilitated.

c) Calculation of "Standard" Operation Costs

Although it is appreciated that there is less opportunity for standardisation of operations (and therefore costs) in the construction industry with the possible exception of house building - every attempt to quantify the complex variety of construction operations should be made.

As previously considered work study procedures are not generally in operation in the industry (Appendix 20), nevertheless the standard labour content may be assessed by a combination of informal activity sampling of same/similar work carried out by the site foreman and a quantification of his cumulative experience. (Similar "activity sampling" has been carried out by the Building Research Station in relation to time lost by different grades of labour involved on house building sites; however, the individual contractor would be likely to

dispute the benefits to be derived from such an exercise, if it were to involve the site foreman.) By actual observation, an analysis could be made of all the elements making up one recognisable operational activity; both methods and time should be studied, bearing in mind the effect of weather on certain operations. (Although it may not be possible to calculate a standard in the fully accepted sense, it is hoped that such procedures may at least indicate a range of "standard" costs appropriate to the operations under consideration.)

Material input will be calculated by the quantity surveyor by referring to the architect's drawings, and where prefabricated units are utilized the appropriate "standard" cost will be included; (if the material schedules and the operational sequences are taken together, the ordering of materials by the contractor's buyer will be facilitated.) Plant and equipment costs will be calculated according to the type of construction and the "standard" method to be used.

d) (1) Construction of a Contract Budget as basis
of Tender ^M

Due to the possible non-acceptance of tenders, many contractors may not consider the creation of detailed "standard" operation costs to be a viable proposition, particularly in view of previous comments indicating an increase in the cost of estimating. (These costs together with apportionment of budgeted head office costs will result in the formulation of the Contract Budget.) Once again it may be argued that there is less scope in the competitive tendering situation than in the case of negotiated contracts. However, this obvious limitation does not necessarily prohibit the use of such a contract budget by the contractor once his tender has been accepted as it will aid the control of site costs and this aspect will now be considered.

d) (ii) Construction of a Contract Budget for
Site Control ^M

Whilst it may be argued that no two construction jobs are exactly alike, nearly all such projects are similar in that they are made up of essentially the same operations; perhaps the various operations are completed in different sequences and in differing amounts but nevertheless they are the same operations. Therefore, over a period of time sufficient data should become available to enable the creation of a budget for a particular contract by use of the "standard" operation costs (or parts thereof) of previously completed work. (Extraction of this data will be facilitated by the more extensive use of the computer.)

In addition to "standard" material, manpower and site costs (including plant and equipment), the contract budget will include a proportion of head office costs (see previous calculations); the inclusion of a profit margin in the Contract Budget will depend, e.g. on whether or not it is agreed by higher management that all this information will be available to site management.

^M Note: It is essential to involve estimators, and where possible foremen, in the construction of the contract budget: this aspect of involvement and participation is of paramount importance in the smooth-running of a system of budgetary control. Argyris has conducted research in this area and has found "that goals are most often accepted if the individual members can come together in a group, freely discuss their opinions concerning these goals and take part in defining the steps by which these goals will be accomplished" (5). Because of the nature of the industry it may not always be possible to involve site management at the earliest stages in the construction of the budget, and, therefore, the need for a good feed-back system from site management

to the estimators is emphasised. Only when such a system operates is the estimator likely to reflect current site experience in his estimate of future tenders (of same or similar work) and the site manager is given some indication that his experience on site is being formally acknowledged. This aspect of budgeting is supported by Dew & Gee, who as a result of research undertaken, state that "participation and consultation in the processes of budget setting were found to be important determinants of whether or not budgets were used. When a manager participated in his budget in the sense of drafting it himself, this strongly supported his use of budgetary information. Even if a manager did not participate but was only consulted still he would be more likely to use budgetary information than would a manager who neither participated nor was consulted" (11).

Although it is difficult, if not impossible, to quantify accurately the benefits which may accrue, it is suggested that the construction of such a budget, e.g. as a means of facilitating site control, may also be used as a communication device, i.e. the contract director may use the budget as a means of communicating to the site manager the latter's responsibilities in regard to the particular contract under consideration.

As an extension to this view, it has also been suggested (90) that "the operational bill aims to improve communications between the design, tender and post-contract stages. It is a multi-purpose document and is used not only as a basis for tendering but subsequently as a management document, helping in the control of building operations".

(e) & (f) Extraction of actual costs and their
comparison with the Contract Budget

Even in a situation where actual costs are extracted on a monthly basis, the site manager should (in principle) receive only

condensed, summarised reports of significant differences (variances) between the actual operation costs and the "standard" operation costs. In the event of computerisation, it is possible to create a programme which extends this principle of "management by exception", particularly in the "real time" situation. In the short-term (say daily or weekly), variances are presented to site management only when they are outside the limit of agreed tolerances, i.e. agreed by both site and higher management.

Example

Material Costs

Standard tolerance $\pm 3\%$

Period	Standard Cost £	Actual Cost £	Cost Variance £	Reported	
				Yes	No
1	50,000	50,500	- 500	-	✓
2	100,000	103,500	- 3,500	✓	-

(The use of graphs may facilitate the control of variances because they illustrate trends clearly and place the detailed (short-term) statistic in perspective. Variances may be depicted in money terms (Appendix 35) or as a percentage of standard (Appendix 36). As an extension of the "tolerance" concept, the extent of the agreed tolerance may be super-imposed upon the second graph (Appendix 36).)

(Related Appendices are - 37 Contract Cost Control Statement - detailed.
- 38 Profit and Loss Statement - summary.)

(g) & (h) Prompting or taking of action to eliminate future variances

It is assumed that only "controllable" variances are brought to the attention of site management, e.g. labour efficiency, in order

not to confuse the issue(s).

Any adverse variance (unless this can be the subject of a variation to original contract) will affect the contractor and not the client; this fact must be fully considered in devising "standard" operation costs. The budgeted amount of profit will be reduced by any adverse cost variances, so management must activate the system of budgetary control by taking the appropriate action. In situations where this is not possible, future "standard" operation costs should be adjusted where it is felt that the original did not reflect a realistic "standard" for material, labour and plant input.

It is preferable to take action before or during a particular operation rather than after the event. "Standard" costs related to a contract budget help the site foreman to ascertain the nature and extent of his labour, materials and plant requirements; being aware of the actual situation he can then make appropriate decisions.

Conclusion

As may be appreciated by the amount of deliberation upon budgetary control and standard costing, there is ample scope for the development of these two techniques in the construction industry; however, further discussion is of necessity curtailed in order to maintain the element of perspective with the constraints of the thesis. Nevertheless, if those concerned follow the lead of the Building Research Station, the way will be open for the use of a tender, based upon "standard" operation costs, as an effective management tool to be also applied in the area of site cost control.

CAPITAL EXPENDITURE PROJECT ASSESSMENT

The assessment of capital expenditure projects by means of the various methods could be developed to a greater extent than is the case

at the present time.

In the architectural sphere, they could be used to compare the costs of various types of design (and resultant construction). Clients could also use some of the methods in order to establish priorities between projects; in the contractor's business, investment in plant, equipment and vehicles could be assessed in a more accurate manner, with a comparison between the purchase and hiring incorporated in the calculations.

In a situation when capital is in short supply, the onus is on the individual organisation (whether client or contractor) to use it in the most efficient way. Although the pay-back method seems to be used in the construction industry to the exclusion of the other methods, the technique of discounted cash flow is not generally applied. It is to be expected that development will occur in this area and some of the larger businesses employ a degree of subtlety in their approach, (e.g. Case Study A - D.C.F. is used in conjunction with the pay-back method; Case Study E - various methods are employed simultaneously in order to aid the decision-making process).

INTERNAL RATIO ANALYSIS

Although there does not seem to be extensive use of this technique in the construction industry, the larger businesses are aware of its potential and, as a result, regularly assess, e.g. profitability; in Case Study A it was stated that "the technical approach will diminish and the group will become more profit-orientated; this reflects the influence of the Chief Executive as a business man, rather than an engineer". This approach contrasts with that of a contract volume-orientated business and it has been stated that the former approach is to be recommended as a pre-requisite for success - "one common characteristic of successful contractors stands out above all others; they are

profit-minded" (98).

It is therefore suggested that development of internal ratio analysis is feasible, not only as a means of profit planning but also as a means of evaluating the success of the business.

Profit Planning

It is essential that every business (whether in the construction industry or not) has a profit plan and the best principle of profit planning is that the amount of profit should be related to the capital employed in the business (e.g. Case Study E : Figure 33 et seq.). Although in the short period it may be decided to accept a relatively smaller rate of profitability, over the longer period of time profits must be planned to give the minimum planned profit required to maintain competitive rates of dividend and a realistic retention policy.

The capacity to make profits depends upon the number of times the capital employed is used (i.e. "turned over"), in a year by the volume of contracts completed, i.e.

$$\frac{\text{Net Profit}^{\text{M}}}{\text{Contracts Completed}^{\text{M}}} \times \frac{\text{Contracts Completed}^{\text{M}}}{\text{Capital Employed}} \times 100 = \% \text{ Profitability}$$

e.g. £ $\frac{10,000}{100,000}$ X £ $\frac{100,000}{50,000}$ X 100 = 20%

or simply - $\frac{\text{Net Profit}}{\text{Capital Employed}} \times 100 = \% \text{ Profitability}$

e.g. £ $\frac{10,000}{50,000}$ X 100 = 20%

(^M These figures may be modified to include Contracts Booked (and Profits thereon) in order to focus attention on the state of the order book at the present and throughout future months/years.)

Evaluation of Business

The technique could be used to a greater extent as a means of evaluating the success of the business, not only in terms of (long-term) profitability but also (short-term) liquidity.

It may be that a business already has developed the technique of budgetary control and has applied it in the area of working capital and cash control. If so, it may be argued that internal ratio analysis applied in the area of liquidity merely acts as a post-mortem. However, the techniques will complement each other, i.e. the indications of regular internal ratio analysis will either have the effect of prompting a change in the actual circumstances (by management action) or a revision of the appropriate budget(s) (by a change in management policy).

Important Ratios

It is suggested that the following are the important business ratios for the building construction contractors:-

- | | | | |
|-------|----------------|---|---------------------|
| (i) | Net Profit | : | Net Sales |
| (ii) | Net Sales | : | Capital Employed |
| (iii) | Net Profit | : | Capital Employed |
| (iv) | Current Assets | : | Current Liabilities |
| (v) | Net Profit | : | Working Capital |
| (vi) | Net Sales | : | Working Capital |

(These suggested ratios are also advocated by Dun & Bradstreet -
(40))

If these ratios are extracted on a regular basis management will have some indication as to the pattern of profitability and liquidity and may, therefore, be able to take appropriate action, e.g. a study of the trends may obviate the need for bankruptcy. An analysis of failures amongst contractors (41) confirms this need for the regular monitoring of the situation by a study of the various ratios, e.g.

<u>Cause of Failure</u>	<u>Suggested Ratio</u>
Lack of adequate working capital)	Current Assets : Current Liabilities
Excess borrowing (when credit available))	
Lack of adequate tax planning)	
Lack of financial control & budgets)	Net Profits : Net Sales
Lack of close supervision & production control)	
Lack of efficient cost accounting system)	(Net Profits : Capital Employed)
Lack of proper methods of bidding)	

As previously intimated (paragraph - Evaluation of Business) a more positive approach would be to calculate budgeted (= required) ratios against which the actual ratios could be compared; either way, there is scope for development, particularly in the smaller business.

Before considering the next (associated) technique, it must be appreciated that it has been assumed that the individual company will attempt to solve the measurement problems associated with the concept of capital employed and both internally and externally a consistent interpretation will be applied over the years - see Part III.)

INTER-FIRM COMPARISON (INCLUDING UNIFORM COSTING)

Use of this technique does not seem to be utilized to any great extent in the construction industry (Appendix 23); the hesitancy stems from the high degree of competition which exists and the inherent fear of divulging important information to other businesses. (Where a large group composed of separate businesses exists, such a scheme is more likely to be in existence as the need for anonymity is obviated:

however, such a scheme would be more accurately designated "internal ratio analysis".)

If businesses were less insular, the economy would benefit as a result of businesses gearing their policies to the tempo of their particular industry as indicated from the various costs and ratios received from the other businesses participating in such a scheme of inter-firm comparison. This sentiment has been subscribed to by an eminent writer commenting on the situation in the U.S.A. -

"What a wonderful accomplishment would be attained for the industry, if the large-sized contractors would agree to co-operate in maintaining standardized (uniform) cost systems and to co-operate in developing standard cost figures for the industry as a whole. In this way, the smaller contractors could make use of the results established by the industry as a whole." (122)

Such a development in the U.K. would seem to be for many practitioners, totally unrealistic and impracticable, considering the different types of businesses associated with this most complex of industries. (see Part III for consideration of some of these problems) However, the Centre for Interfirm Comparison Ltd. have been pioneers in this sphere and it is, therefore, appropriate that a commentary on their activities is included in order to set the situation in perspective. To quote the Deputy Director of the Centre - "We have been operating inter-firm comparison schemes in various branches of the construction industry for seven or eight years - first, on a pilot basis and subsequently on a more expanded basis. The current schemes in building and civil engineering cover about 100 firms and are carried out on a regular annual basis (Appendices 39 & 40 - updated to 1971); we also have comparison projects covering certain specialist trades such as painting and decorating. There is no doubt, therefore, that interfirm

comparison in the industry is practicable; we are engaged in a number of promotional and educational activities which are designed to bring comparison projects to the attention of a wider range of firms in the industry and we hope that the number of firms participating will steadily grow. I may say, incidentally, that these numbers compare quite favourably with the number of firms taking part in comparisons in many other industries.

As part of our work, we are in frequent contact with firms participating in comparisons and with other firms regarding the schemes; this contact enables us to obtain valuable information about the attitudes of firms to interfirm comparison, the accounting problems which participation involves and the use to which they are putting the results. In other words, we are continuously engaged upon an evaluation of the way in which the work of interfirm comparison in the industry is developing and should be improved."

Development of such schemes should be possible within the industry, although it is suggested that less sophisticated pyramids of ratios than the two utilized in 1969 would prove more acceptable to the medium and smaller sized businesses. (The latest set of ratios issued by the Centre for Interfirm Comparison in 1971 have applied this principle - see Note/Appendices 39 & 40.) The important ratios previously considered (within the context of internal ratio analysis) could form the basis for a comparatively simple pyramid of ratios, e.g. Figure 52.

Ratio 1 is the primary indication of operating success; it summarises the results achieved by management in using the resources available to it, i.e. it may highlight the relative inadequacy of the return on capital employed.

Ratio 2 shows the extent to which the difference between the

Interfirm Comparison

Simple Pyramid of Ratios

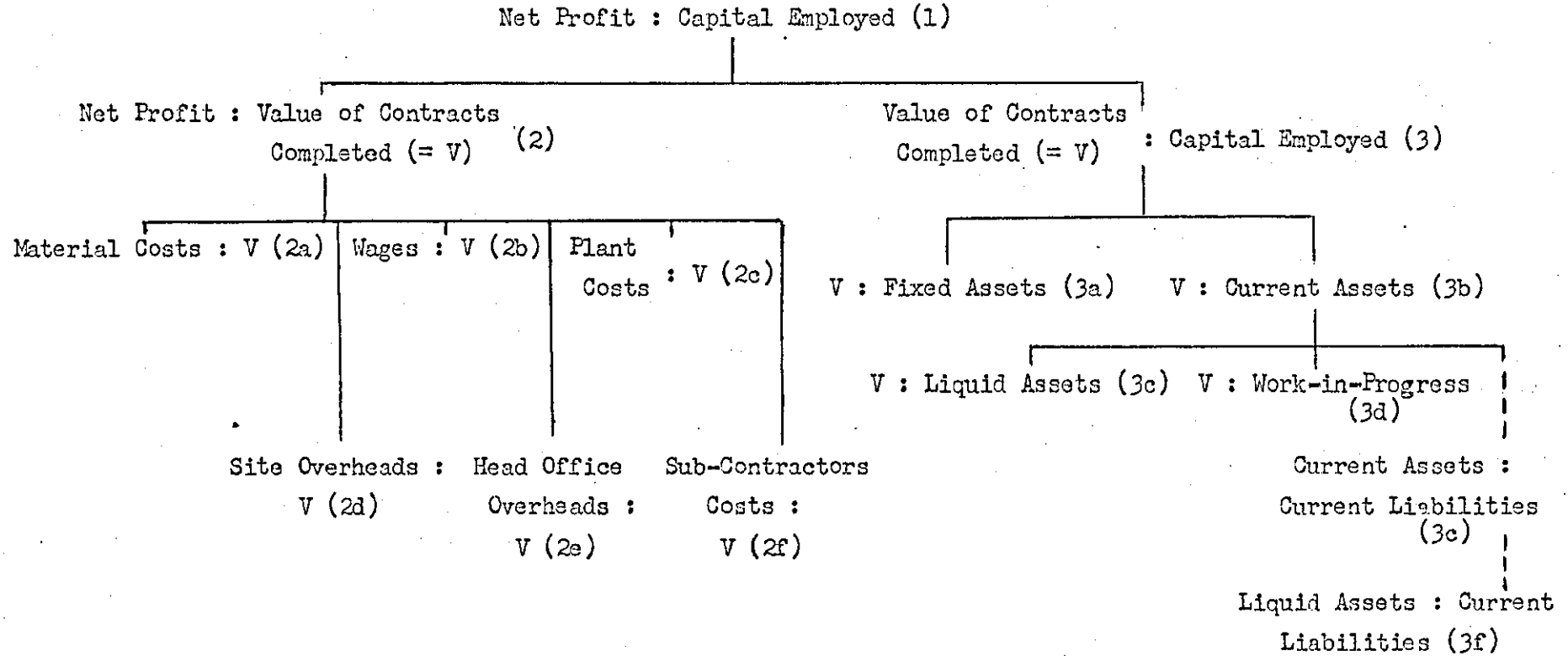


FIGURE 52

participating members of the scheme is due to the level of profit margin attained, whereas Ratio 3 indicates how much of the difference is due to the degree of asset utilization.

The various subsidiary ratios will enable the participants to analyse the causes of differences in greater depth, e.g. the left-hand side of the pyramid (Figure 52) indicates the effect of the major cost areas of the business, whilst the right-hand side (Figure 52) indicates the effect of differences in the use of the various kind of assets employed in the business with added emphasis on the importance of the liquidity position of the individual business.

"It is now generally accepted that a firm can, by comparing certain of its accounting, costing and other performance figures with those of other firms in its industry, discover and evaluate weaknesses in its policy and operations which might go unnoticed." (62)

Many industrialists whose businesses have taken part in such a scheme have confirmed the benefits derived from its implementation; it is, therefore, contended that wider acceptance of the technique in the construction industry would lead to increased efficiency. Not only would the individual business be able to evaluate its own profitability but the (resultant comparative) data could be used as a basis for setting performance targets within the context of budgetary control (and "management by objectives").

OTHER TECHNIQUES

Although not strictly techniques of management accountancy, it is considered appropriate to comment briefly upon the relevance and possible development of the associated techniques of "Model Building" and "Management By Objectives" as these are areas which seem to be of interest - at least so far as the future is concerned - to the members of the construction industry (see Case Studies A, B & E, e.g. A has

recently introduced a management share scheme as a feature of their approach to "Management By Objectives".)

Model Building

"A model is any device which is used to simulate in the laboratory or planning office, some process or practical situation"(26); this representation may take a numerical (or other) form. A simple example of a model (equation) which can be built to represent a "practical situation" is the one which represents the total cost involved in the production of a projected level of output, i.e.

$TC = F + VQ$			
When	TC	represents	Total Cost
	F	"	Fixed Costs
	V	"	Variable Costs* and
	Q	"	Level of output.

* i.e. per unit

Conclusions based upon the performance of a model should not be accepted unless there is good reason to believe them reliable (to a satisfactory level of approximation); even though a hypothesis based on such a model may not prove wholly satisfactory, it may be accepted until a better one is expounded.

One application advocated is in the area of break-even analysis (61), the break-even chart having been equated to "a simple mathematical model based upon the distinction between fixed and variable costs". (99) Another area of application is that of internal audit within the context of the creation of a model which attempts to simulate the principles of probability theory (alternative application - Appendix 7).

In addition (and as previously advocated in the section concerned with the possible development of budgetary control and standard costing) a model could be created which is based on the assumption that the whole construction process can be divided into a number of separate

tasks, or functions, each of which achieves a recognisable goal. Having completed this initial division, each function or task is analysed into smaller units (procedures) each of which may consist of one or more operations. The data resulting from the inter-relationship of the various functions and procedures will then be quantified in the model and, e.g. the introduction of a "risk" variant (see Appendix 3) will indicate the possible effects on profit potential on various contracts having varying degrees of the constituent ("risk") elements in the creation of their total contract costs.

However, "accountants must be trained to think in terms of empirical hypotheses rather than (legalistic) rules if accounting is to improve in practice as a result of (such a) theoretical development" (121). There has been a lack of work done in regard to model building in the construction industry and hesitancy on the part of accountants may have been a contributory factor. Nevertheless such model building should be developed as a natural extension of the wider application of the various techniques associated with management accountancy in future years and the use of the computer will no doubt accelerate this development.

(As an example of current development, a company has been cited which combines and calculates a cost and variances model, and not only reports variances for the past period but also the variances that are to be expected in the following period, unless management action(s) are taken to rectify the position (30)).

Nevertheless, models must be created and used with extreme care, e.g. due consideration must be given to the limits of input accuracy. "Models used have to be tested and shown to have relevance and validity for a particular firm. In the physical sciences testing can often be done in laboratories. No such facilities are available

in the area of business and reliance usually has to be placed on the model's ability to explain the firm's past experience and on maintaining a critical attitude to the assumptions used in generating decisions".(18)

Management By Objectives

The technique of Management By Objectives has been defined as "a dynamic system which seeks to integrate the company's need to clarify and achieve its profit and growth goals with the manager's need to contribute and develop himself" (59); it is a concept which integrates the needs of the business with those of the employee - development of the business and the employee are complementary, e.g. the objectives of the site manager are to complete a particular contract within the prescribed time scale and the financial constraints, whilst adhering to the stated technical specifications; regular attainment of these objectives on various contracts should ensure personal development of the manager within the needs of the company.

To many accountants, this technique would seem to be a natural extension of budgetary control; this view has been confirmed by the Institute of Cost and Works Accountants - "if the principles (of Management By Objectives) are applied within the framework of a budgetary control system, there is likely to be a high degree of success. Unless financial targets in the form of budgets are used, there will be difficulty in relating performances to profitability and management by objectives will have little meaning" (60).

In Case Study A, employees' objectives were said to be geared to the attainment of the target profit but consideration of the development of such financial incentives is only at an early stage, e.g. if the profit is attained, a flat 10% bonus on the salary of each company's managing director is awarded, to be split between the staff on merit. As yet, there is no formalisation of the integrated management development concept.

In industry there is "encouraging progress in the use of the technique" (59) in:-

- a) creating a set of proven methods which together make a total and comprehensible management system to improve company and manager performance,
- b) reconciling in a practical way the viewpoint and practices of the quantitative 'scientific' managers with those of the behavioural and social scientists, and,
- c) integrating business planning with the creative self-development of human beings.

Any business associated with the construction industry, if it is to consider the introduction of this technique, must ensure total involvement and commitment of the Chief Executive and the Board of Directors. (In Case Study E, the need for management development was stressed by the Chief Executive, e.g. managers at every level are expected to have one of their subordinates lined up and able to take over their job at a moment's notice.) Introduction of the technique must inherently reflect the forward-looking attitude of construction management; perseverance will be necessary to overcome resistance to change by the involvement of these individuals affected by its introduction.

Management By Objectives is a technique which encompasses good accepted management practice, i.e. planning, operating and controlling, and as such could be used to advantage in the construction industry. However, little indication as to the awareness of this fact is evident, and as yet, nothing has been published (even by J.W. Humble, who has contributed so much to the development of the technique in this country and elsewhere).

Conclusion

There would seem, therefore, to be ample scope for the development of all the aforementioned techniques in the construction industry; obviously in a thesis of this nature, only the principles associated with this possible development have been considered. However, further research of a more advanced nature could possibly stem from some of the ideas and principles outlined, e.g. the design of a management information system to meet the needs of the different levels of construction management is considered a potential area for such extensive research.

Having now discussed the extent to which the various techniques associated with management accountancy may possibly be developed and modified, the concluding part of the thesis follows.

PART VI

CONCLUSIONS

PART VI

CONCLUSIONS

SECTION 1

General Introduction

Within the parameters previously specified as to the nature of the data collected and used, and bearing in mind the inherent constraints of the complex construction industry, the only general conclusion that may be considered to have been reached is one of "non-proven"; moreover, a more positive attitude could be deemed inappropriate indicating both a naive and impertinent approach to the task. In view of the fact that the assessment is essentially of a qualitative type, it may be considered more appropriate to think in terms of "concluding observations" rather than dogmatic "conclusions"; some of these may be thought obvious to those acquainted with the industry, whereas others may be not so self-evident.

However, it is apparent that such an appraisal of the industry could make some contribution (however limited) towards prompting all interested parties as to the relevance of the various management accountancy techniques to the construction industry and making them aware of the fact that although their industry is very complex and diverse in character, many of the techniques may be modified successfully and applied to practical situations.

This view is subscribed to by the Management Advisory Officer of the Royal Institute of British Architects who has intimated that "This appraisal is much needed; it is found on every course organised by the Institute that people want "inter-firm comparison" on the range

of management accounting techniques employed".

The industry has the reputation of being reticent in regard to the introduction of new techniques and although this seems to be the case in the smaller-sized company, this apparent lack of enthusiasm also applies to other industries; the construction industry is far from being unique in this matter. "Management accountancy is most efficient at finding management weaknesses and although it is intended to be damning criticism of management accountancy, the frequently heard "I am not going to change my business to suit any accounting information" is probably the greatest tribute to its ability as a fault finder". (32) However, it must not be overlooked that information emitting as a result of the application of management accountancy techniques may also bring to the attention of management the efficient areas of activity.

Bearing in mind the aforesaid comments, an attempt will now be made to formulate some conclusions in regard to management accountancy, the techniques associated with the subject and their significance in the construction industry. As may be appreciated, it is difficult to isolate conclusions in such a context, but in order to offer positive conclusions and suggestions rather than mere exhortation, it is appropriate to consider the role of the accountant within the management structure of a contractor's business, the accountancy information needs of management in the environment of the construction industry and the use of the various techniques as a means of fulfilling those needs. In addition, the possible development of the techniques will be reviewed together with an indication as to where the responsibility for such development lies.

SECTION 2

Management Structure, the accounting needs of management and the role of the accountant

It is concluded that the management structure which naturally evolves from the nature of contract work seems to be appropriate and the efficiency of the industry depends upon the quality of relationships on site and between head office and each individual site. However, it has been said (84) that there exists in the industry "a lack of cohesion between the various parties involved" and it is possible that the accountant can obviate this situation by extending the parameters of the information system.

The foreman is an extremely important individual in the management structure and is essentially a link between management and men; the "climate" of the site is largely determined by him and his personal relationships with his men. One of the problems considered to be of primary importance in 1962 (84) was "the great need for good quality foremen" and this problem is yet to be solved by the industry. Very few foremen seem to be interested in accounting information and are satisfied with the verbal items emanating from their site manager.

The site managers and contract managers are satisfied with the type and frequency of information received from the accountant but suggest that there is room for improvement in the speedier presentation of information.

Within the management structure of the individual construction company the majority of accountants act as financial stewards rather than financial advisers and this fact would tend to reflect "the historical bias which most accountants derive from the nature of their daily work" (99). There would seem to be an element of hesitancy on

the part of accountants to become involved in the wider implications of management; this is possibly because "accountants by tradition and training are conservative and cautious in their attitude" (112).

In some of the more "traditional" companies in the industry, there seems to be a certain lack of respect for the accountant in his advisory capacity. One managing director of a medium-sized company summarised this opinion by intimating that "the accountant is nowt but the scorer".

However, if the current flow of advertisements for accountants in the industry is any indication, there is an increasing awareness of the contribution that the accountant can offer towards increasing efficiency. (According to the Reed Executive Ltd. salary survey (1970), "construction seems to be the most profitable industry for a chief accountant"; however, it is suggested that high salaries are being offered to compensate the frustrations of working in a "traditionally repulsive and inefficient sector".)

SECTION 3

The Use and Relevance of Management Accountancy Techniques

Quantity surveyors are of the opinion that the majority of the techniques could be applied in the construction industry; however, they add a rider to the effect that many of the techniques would have to be modified to suit the particular needs of the industry. Nevertheless the potential for development exists.

As to the actual use of the techniques, the consultants' viewpoint indicates that the industry is in two camps; on the one hand there seem to be contractors who take an objective view of cost reporting and financial controls and forecasts and apply those techniques (modified when necessary) which are likely to meet their needs. The remainder of the industry appears to work on an extremely ad hoc basis and accounts historically for completed contracts. This division is dependent on the size of the companies concerned, e.g. the larger contractor tends to use the range of techniques associated with management accountancy.

This viewpoint is substantiated by the general indications of the survey, i.e. all the techniques are used in the industry but in the case of the smaller firm, the degree of utilization is either limited or non-existent.

It would be wrong to assume that the various techniques of management accountancy are being applied to the same degree throughout the total population of companies in the construction industry but the various case studies indicate that companies in the medium to large range are applying and developing various techniques to advantage. In the case of the large contractor, the full range of techniques is in use and there is also a degree of development; in the case of the

medium-sized contractor, there is not the same degree of penetration. Indications are that this type of firm is not accounting-orientated and as a result there is far from general use of all techniques. Very limited use of the techniques seems to be the case in the small firm. However, encouraging signs exist in the sphere of the sub-contractor, although at the present time the extent of usage would seem to be rather limited. The successful contractor is using all the techniques (with the exception of inter-firm comparison) within a wider concept of good business management, and such utilization has contributed towards the success of the company. In the case of the company using budgetary control in conjunction with standard marginal costing, every attempt is being made to orientate the information to the specific needs of technical management.

The extent of usage of the various techniques within the construction industry compares favourably with the use throughout general industry although this is only a weighted comparison and "two wrongs don't make a right" in the sense that there is a limited application of management accountancy techniques throughout industry as a whole.

Therefore the consensus would seem to indicate that the techniques are being used in the industry in varying degrees as aids in more realistic decision-making and positive cost control.

The Barwell Report (83) subscribes to this view in its general observations that - "the (outstanding) impression we have gained is of an industry the progressive members of which are lively and full of new ideas, willing to experiment and not afraid to change their practices and procedures". In order to establish a relationship between this particular section and the next two sections which are

concerned with the development of the techniques and in contrast to the aforementioned comments, it is appropriate to quote again from the Banwell Report (83) - "the industry and associated professions do not appear to move forward with the speed and purpose of these active members. We consider that the most urgent problem which confronts the construction industry is the necessity of thinking and acting as a whole".

SECTION 4

Possible Development of the techniques

The possible development of the various techniques of management accountancy in the construction industry should be seen against the economic background, e.g. "Recent constraints on the ready supply of capital have changed the emphasis to a growing realisation that a company of the 70's must consider liquidity to be as important as profitability" (45). This fact is even more pertinent to the construction industry and any technique which aids cash control is to be considered a potential aid in the area of financial control and management.

All the techniques considered within the terms of this thesis

can be developed and modified for use in the industry to a greater or lesser extent and it is also suggested that an improvement in "information flow" would be welcomed by the various levels of management.

Insofar as individual techniques are concerned, development is suggested in the following areas, inter alia -

Internal Audit

This technique could become more closely associated with an "organisation and methods" approach to cover, e.g. information audit.

Marginal Costing

The application of the contribution/marginal costs factor to the actual marginal (site) costs of a contract could obviate the need for actual (short-term) interim valuations.

Break-Even Analysis

Projects using alternative materials/structures with varying degrees of necessary maintenance may be compared by a development of this technique.

Long Term Forecasting and Planning

Although there would seem to be less opportunity for the development of this technique in the industry, it is imperative that more firms become marketing orientated.

Budgetary Control and Standard Costing

Budgetary Control is a vital aid in the sphere of cash control and Standard Costing could be developed as a natural extension of the "operational" bill of quantities, in order to facilitate site control.

Capital Expenditure Project Assessment

In the architectural sphere, the various methods could be used to compare the costs of various types of design (and resultant construction).

Internal Ratio Analysis

Development of this technique could encourage the industry to become more profit-orientated (rather than volume-orientated).

Inter-Firm Comparison

A simple pyramid of ratios could be developed in order to encourage an exchange of information and thereby obviate the insular attitude of management in the construction industry.

Model Building

Model Building could be a natural extension of the wider application of the various management accountancy techniques and the use of the computer will no doubt accelerate this development.

Management By Objectives

This is a technique which is concerned with the involvement and development of individual managers within the required development and growth of the company and as such is a technique of great potential for the construction industry.

After having considered some of the areas in which the various management accountancy techniques could be developed, the next section will consider briefly the related responsibilities of the various parties associated with this heterogeneous industry.

SECTION 5

Responsibility for Development

Introduction

It would seem from the earlier deliberations that there is scope for both an increase in the general use of management accountancy techniques in the construction industry and also for development, modification and improvement of those techniques which are in use at the present time.

It is also suggested that an industry facing rising costs and smaller profits, as well as a threat of a cut in public sector contracts, has every reason to seek the savings which the expert use of the computer can offer, e.g. computer preparation and pricing of Bills of Quantities in a form suitable for managerial and site control - (92).

Although it is appreciated that the responsibility for such development is a joint one, in order to facilitate an analysis of its various facets, the responsibilities of the industry itself, the universities and other educational/training bodies, the professional institutes, the client and the individual accountant will now be considered under separate headings.

The Responsibility of the Industry

The main responsibility for development as an aid for increasing efficiency rests with the various firms associated with the industry, or more specifically with the higher management.

It is suggested that every Board of Directors (or Board of Management) should include one member (not necessarily a qualified accountant) who fully appreciates the principles of management

accountancy and the associated techniques: the quantity surveyor traditionally fulfils this role. (In 1965, 26.3% of failures in the U.S.A. industry were due to the fact that management's experience was not well rounded in sales, finance, purchasing and production (41).) A less insular approach to the exchange of data is also important and whenever possible main contractors should influence their sub-contractors in the use of the appropriate techniques.

A sound philosophy should be evolved which allows for an extensive degree of decentralisation of authority and responsibility, within the framework of corporate policies.

Higher management should encourage a regular interface between the accounting staff and site management (including foremen); accountants should have access to sites and should be urged to visit those which are within their "area of responsibility". "Sound co-operation between financial and technical people is essential" (56).

Both site managers and foremen should feel involved in the financial implications of contract work and a good feed-back system is essential if they are to participate fully in construction management. "Feed-back for the purpose of improving future action is an essential of the decision-making process. It is unlikely that future action can be improved without knowledge of the results of action just completed; it is reasonable to believe that skill in making decisions must be dependent upon knowing the result of previous decisions" (113). Although in the short-term situation, site management may not be able to influence the current contract, such feed-back of accounting information will help to quantify their experience and therefore could make a positive contribution towards improving performance in future contracts.

Accounting information, if properly disseminated, can instil loyalty; the recipient is more likely to understand and appreciate his contribution to the total effort and the higher management of the industry should realise that such a situation is vital in construction work which relies upon a favourable site environment.

It has been said that the quality of management is fundamental to the growth of productivity and in this process two of the major factors are:-

- a) "the introduction of modern management techniques (often undertaken with the help of management consultants), and,
- b) the systematic development of junior and middle managers" (61).

Education in the techniques of management accountancy should be included in this development and the firms in the industry should consider utilizing the facilities offered by the various professional institutes, universities and the Construction Industry Training Board; a relevant comment from the C.I.T.B. is that "little management training has been requested and little is therefore available". (Appendices 41 - 43) In addition, each individual firm should organise internal courses which will also have the added advantage of bringing together different management disciplines.

The status and significance of the site manager should be reappraised and much more attention should be given to his training and development. "These managers are not simply technicians for whom a craft and technical training alone is sufficient; they are men of whom competence is required also as managers and organisers" (83).

Another way in which the industry may encourage the development of management accountancy techniques is in the employment of

academic consultants or alternatively encouraging joint research between members of the firm's staff and the staff of a nearby university. In fact it has been recommended that within the context of scientific and technological development "periods of working in both industry and universities should become part of the career pattern of people from both sides" (33): a similar pattern could emerge on the management side of industry.

(If it is considered that the academic cannot contribute in the sphere of consultancy, due to the fact that there does not seem to be an unawareness of the relevancy of the techniques of management accountancy in the industry, then he could possibly co-operate with the accountants of those firms whose management have yet to be fully convinced. This co-operation could take the form of participation in the internal education and training programmes - previously mentioned, the academic contributing by way of a discourse on the relevant principles and the accountant relating them to the individual organisation.)

The construction industry should attempt to evolve a self-perpetuating system of management based upon the efficient utilization of scientific knowledge, in order to attract the right calibre of accountant: it must provide a challenging opportunity within a profit-orientated management team for it is a well-known fact that the image of the industry tends to militate against the recruitment of high calibre executives and managers.

The Responsibility of the Education and Training Institutions

Up to now the Construction Industry Training Board has tended to concentrate its efforts in the direction of medium to large sized firms but in future will concentrate more on the smaller company. (App.43)

Responsibility for courses to the former group will rest more and more on the Universities, Polytechnics and Colleges of Technology and even at the present time certain of these are providing financial courses designed specifically for executives in the construction industry. Some universities and polytechnics have actually been commissioned by the C.I.T.B. to run courses on their behalf whilst others have initiated their own courses.

In addition, professional institutes particularly associated with the industry have a full programme of courses which includes financial control. (e.g. Appendix 42)

The training boards have three distinctive contributions, i.e.

- a) to encourage industry by provision of appropriate courses,
- b) to stimulate management education and training in the small company, and,
- c) to create a sound training infrastructure throughout companies.

The C.I.T.B. is realistically turning towards the smaller company; the medium-sized company will tend to use the university and polytechnic facilities, whilst some of the larger companies seem to prefer to cater for their own needs.

Perhaps a degree of rationalisation can be initiated by the C.I.T.B. whereby the various bodies may work jointly in providing a nationwide network of courses geared to the requirements of the different sized organisations. (It has been recently reported (17) that "there has been a very marked increase - 82% - in the demand for activities (courses) concerned with the many aspects of financial planning and control".) This surely indicates a growing awareness in the U.K. to the importance of finance which no doubt reflects the changing attitude

of all industry, including construction.

It would seem that the various institutions are accepting their responsibilities insofar as the provision of finance courses is concerned. However, an anomaly exists in the fact that the C.I.T.B. is not represented on the Joint Training Board on the Training of Accountants; this committee created under the direction of the Central Training Council will draft recommendations for the training of accountants throughout British Industry.

Although the universities are also providing the necessary courses, development of management accountancy techniques could be encouraged by the initiation of research. This research if it is to have the maximum applied effect should preferably be the work of interdisciplinary teams, e.g. an accountant and a civil engineer working together on some industrially significant problem. This would also cement the relationships between the various disciplines in the long-term, an aspect also to be considered within the context of under-graduate education, and also post-graduate education.

It has been said (106) that universities and business schools "must start basing their pronouncements on actual study and not on simple pontification". (In this sphere, some universities are hoping to establish "industrial" Ph.D. programmes - see Appendix 44).

In the U.K. there tends to be a fragmentation of university research; therefore, in order to offset possible duplication and co-ordinate research effort, some clearing house should be established so as to enable the university population make a more positive and dynamic contribution to the industry (and the economy of the country).

Professor R.W. Revans, an advocate of "practical work-place orientated research" is convinced that "the future of management research lies in the developing methods of problem definition and

solution application" (44), e.g. within the development of an accounting information system, a consideration of the real needs of site foremen. (Scope obviously exists for further research and a development of this particular thesis is envisaged, e.g. a complementary study within one section of this heterogeneous industry or alternatively a consideration of one technique in depth.)

Where, however, it is felt that "such research conducted on a part-time basis has limited usefulness in the solution of practical problems" (79) (as such work may not combine well with a lecturing programme), universities should encourage suitable staff to return to industry for periods of one to two years, via secondment (52).

As far as the accountancy institutes are concerned there are few signs of direct interest in the construction industry, e.g. in the Banwell Report (83) there was no mention of the accountant's contribution towards more efficient contract management and no evidence was submitted by any accountancy organisation. (However, one consultant commented that "the Institute of Cost and Works Accountants might develop an interest in the medium term"; perhaps they could sponsor university-based courses for the industry, as every attempt must be made to encourage the accountant of the present (and of the future) to take a more positive attitude, to become more of an adviser to management than merely a financial steward.)

As previously intimated, certain institutes directly associated with the industry are running courses and in addition an awareness of the practical relevance of management accountancy to their own specific areas of activity is indicated by the Royal Institute of British Architects. (Architects in practice face tough competition and are expected by their clients to provide the highest possible standard of service. Success, or even survival, depends on rigorous control of

a firm's cash position and the most economical deployment of its staff. Every firm must know how much it can afford to spend on any job if it is to be profitable. In order to assist the architect, the R.I.B.A. have prepared a manual (107) which covers the following:-

- (1) forecasting and budgeting of the liquid cash position,
- (2) relating actual to forecast, and
- (3) performance targets (in respect of each job).

It is suggested that the system in the manual is indispensable for the greater majority of offices and of great value to the remainder.)

Before considering the responsibility of the accountant, a brief reference will now be made to the responsibility of the client insofar as the development of techniques associated with management accountancy is concerned.

The Responsibility of the Client

Although it may be argued that the client has no such responsibility, it may be possible for the client to influence the development of the techniques in the construction industry by:-

- a) limiting invitations to tender to a realistic number of firms, thereby limiting the completion of "unnecessary" tenders, (see note on following page *)
- b) stipulating adherence to recognised accounting procedures associated with a precedence diagram/critical path schedule (Appendix 34), and,
- c) entering into negotiated contracts whenever possible in order

to facilitate fuller use of techniques and thereby improve efficiency and lower costs.

"There are most powerful arguments for limiting invitations to tender to a realistic number of firms, all of whom are capable of executing the work in question to a recognised standard of competence; to rely on price alone without regard to competence and experience, the quality of materials and finish and the ability to comply with a programme is to ignore factors vital in securing value for money spent" (83).

The Responsibility of the Individual Accountant

Although the development of the various management accountancy techniques is a joint responsibility, the initial initiative lies with the individual accountant.

The industrial accountant should take every opportunity of educating management in the techniques and the practising accountant should give his clients as much detail as is economically possible by the introduction of audit in depth.

"Accounting is concerned with communication between human beings; it involves the establishment and operation of information systems" (118): it is, therefore, imperative for the accountant to review his lines of communication and improve them where possible. It may be argued that because of the geographical barrier that exists between the accountant (situated at head office) and site management, the accounting information should be so presented in order to encourage accurate interpretation and the promotion of prompt and correct management action.

The accountant should "educate the contractor to become a

more efficient operator with an overall plan for more profits by adopting modern methods of operating control, measures and standards of performance, reporting, analysis and comparison" (122). As and when necessary he should also initiate his own reports, experimenting on methods of presentation when appropriate. Where the accountant believes he has discovered something of significance he should convey his conviction to management.

In addition, the accountant working in the construction industry must become more involved in the general management scene; he must realise that the successful application of management accountancy techniques requires the closest co-operation between himself and technical management. As a construction company is basically so different from a manufacturing business, he "must take the trouble to gain the specialized knowledge of this peculiar industry" (122).

Conversely, he should be ready to learn from the experience of accountants in other industries and be less insular in his approach to his discipline. (The survey included within the thesis indicated that only 28% of the accountants had spent more than 50% of their working life in other industries - Appendix 22.)

As previously discussed within the responsibilities of the management of the industry, it will be the responsibility of the accountant to exercise some ready means of effective control over the various sub-contractors; this control may take the form of establishing "standard costs" for certain repetitive types of work.

Finally, the U.K. accountant must become more like his U.S.A. counterpart, i.e. he should become more business-minded and orientate his company towards a profit-g geared policy. He should endeavour to substantiate the hypothesis (35) that "accounting training has a special

and unique relevance for decision making at the top management level" and take his rightful place in the construction management team.

Bearing in mind the magnitude of the construction industry, any increase in efficiency resulting from the increased utilization, development and modification of the techniques associated with management accountancy, should make a vital contribution to an improvement in the economy of the United Kingdom.

APPENDICES

LIST OF TRADES IN THE CONSTRUCTION INDUSTRY

General Builders

Contractors (Building & Civil Engineering)

Civil Engineers

Plumbers

Joiners and carpenters

Painters

Roofers

Plasterers

Glaziers

Demolition Contractors

Scaffolding Specialists

Reinforced Concrete Specialists

Heating and Ventilating Engineers

Electrical Contractors

Asphalt and Tar Sprayers

Plant Hirers

Flooring Contractors

Constructional Engineers

(Annual Bulletin of Statistics -
M.P.B.W. - 1968)

NATURE OF THE BILL OF QUANTITIES

(References:- 97/109/110)

"Quantities" refers to the estimated amounts of labour and materials required in the execution of the various items of work.

("Quantities" is an analysis of finished work in terms agreed nationally between contractors and quantity surveyors/engineers to assist the estimation of resource requirements and thus price.)

Most items of labour and material are measured in yards and may be linear, square or cubic, e.g.

<u>Description of work</u>	<u>Civil Engineering Unit of Measurement</u>
Demolition of pipe-work	Linear yard
General excavation	Cubic yard
Concrete	- do -
Brickwork	Square yard (stating thickness)
Structural Steelwork	Tons or cwts. (i.e. weight)
Road Surfacing	Square yard

The primary function of a "bill of quantities" is to set down the various detailed items of work in a logical sequence and recognised manner, in order that they may be readily priced by contractors: as a result, all interested contractors tender on the same information.

Insofar as the labour element is concerned, the time required (in days) for the various individual operations may be calculated by application of the following formula:-

Estimated Production Hours in Operation (EPH)

Number of productive operators (N) X 7 hours per day (7)

Therefore where - EPH = 132 hours

& N = 4,

the time required in days can be calculated as follows:-

$$\frac{\text{EPH}}{N \times 7}$$

$$\frac{132}{4 \times 7}$$

∴ Time required = 4 days (see p.21)

CALCULATION OF PROFIT FOR TENDERING PURPOSES

(including the concept of "risk")

Contract Tender

<u>Item Number</u>	<u>Description</u>	<u>£</u>
1	Labour	350,000
2	Materials	600,000
3	Construction Plant	450,000
4	Sub-contractors	100,000
5	Site Overheads	<u>300,000</u>
6	<u>SITE COSTS</u>	1,800,000
7	Head Office Overheads	<u>54,000</u>
8	<u>TOTAL COST</u>	1,854,000
9	Profit (including risk ^{*)})	<u>127,500</u>
		1,981,500
10	ø Nominated Sub-contractors	60,500
11	ø Provisional Sums	108,000
12	ø Contingencies	<u>200,000</u>
13	<u>TOTAL TENDER PRICE</u>	<u>£2,350,000</u>

(^{*} "Risk" is the risk of loss due to the possible inaccuracy of costs resulting from misjudgement, unforeseeable mishap or misfortune)

(ø Expenditure of these items is the prerogative of the client)

The calculation of profit (£127,500) is related to risk and competition; the latter will tend to be assessed by the directorate (aided by marketing management). The risk factor is assessed by the

estimator bearing in mind his experience of the type of work and the constituent elements of the particular contract. Depending on the degree of risk involved he will weight each item, e.g. the efficiency of labour (item 1) might in fact be much less than anticipated; however, sub-contractors (item 4) will be restricted by their own tenders. Therefore, such a comprehensive appraisal could give the following indications of profit and risk:-

<u>Element of Cost</u>	<u>% factor</u>	<u>Profit + Risk</u>
Labour	10%	35,000
Materials	5%	30,000
Construction Plant	10%	45,000
Sub-contractors	2½%	2,500
Site Overheads	5%	<u>15,000</u>
		<u>£127,500</u>

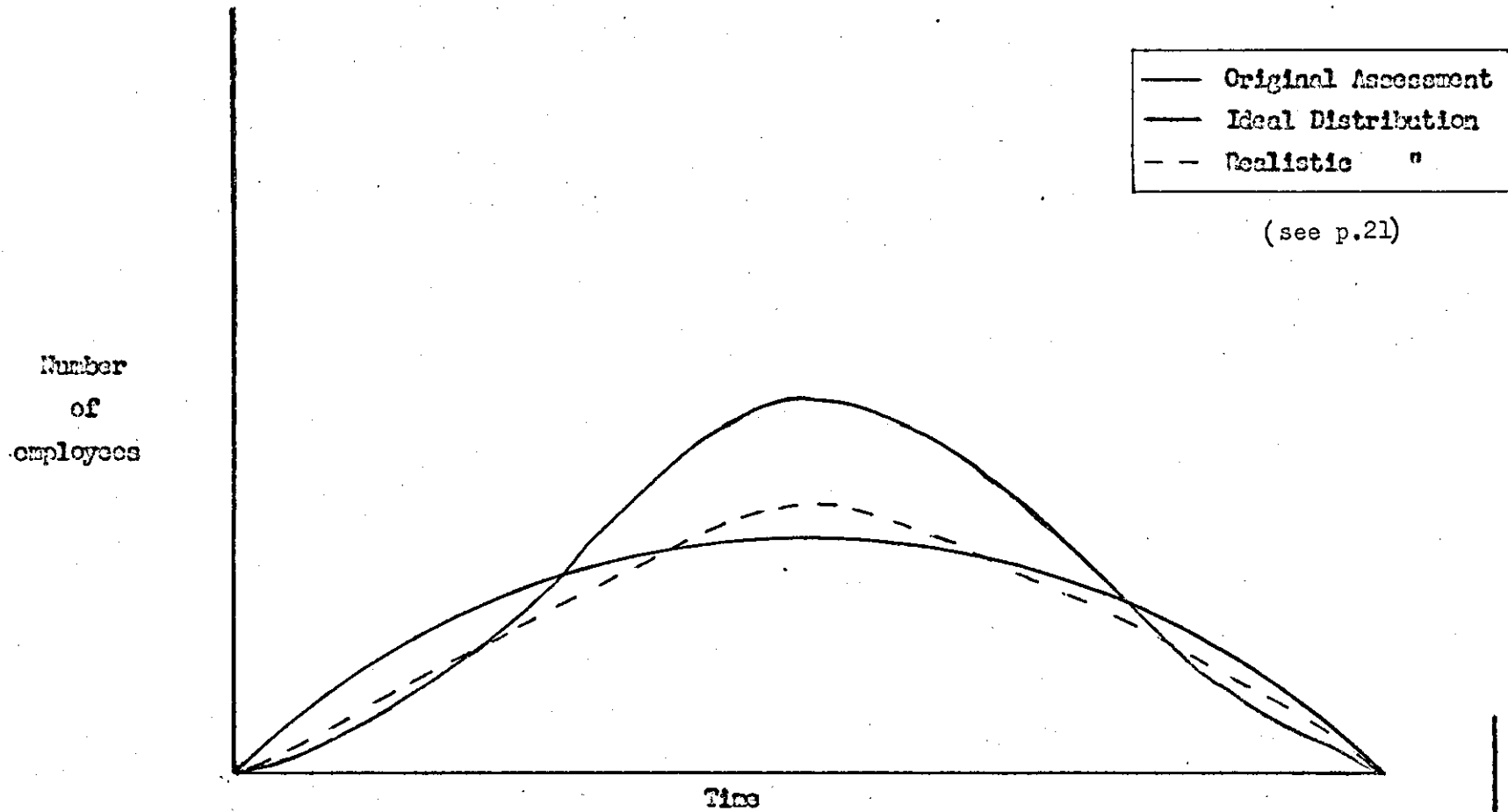
If the client exercises his prerogative to spend say £100,000 of the contingencies on additional work, negotiations between the client's professional adviser and the contractor will be based upon the principle that similar work should attract similar prices. Therefore, this additional work would be marked-up by 6.9%,

i.e.	<u>Profit</u>	X	100	
	Total Costs			
	127,500			
£	<u>1,854,000</u>	X	100%	= 6.9%

- J.H.W. Turner acknowledged (115)

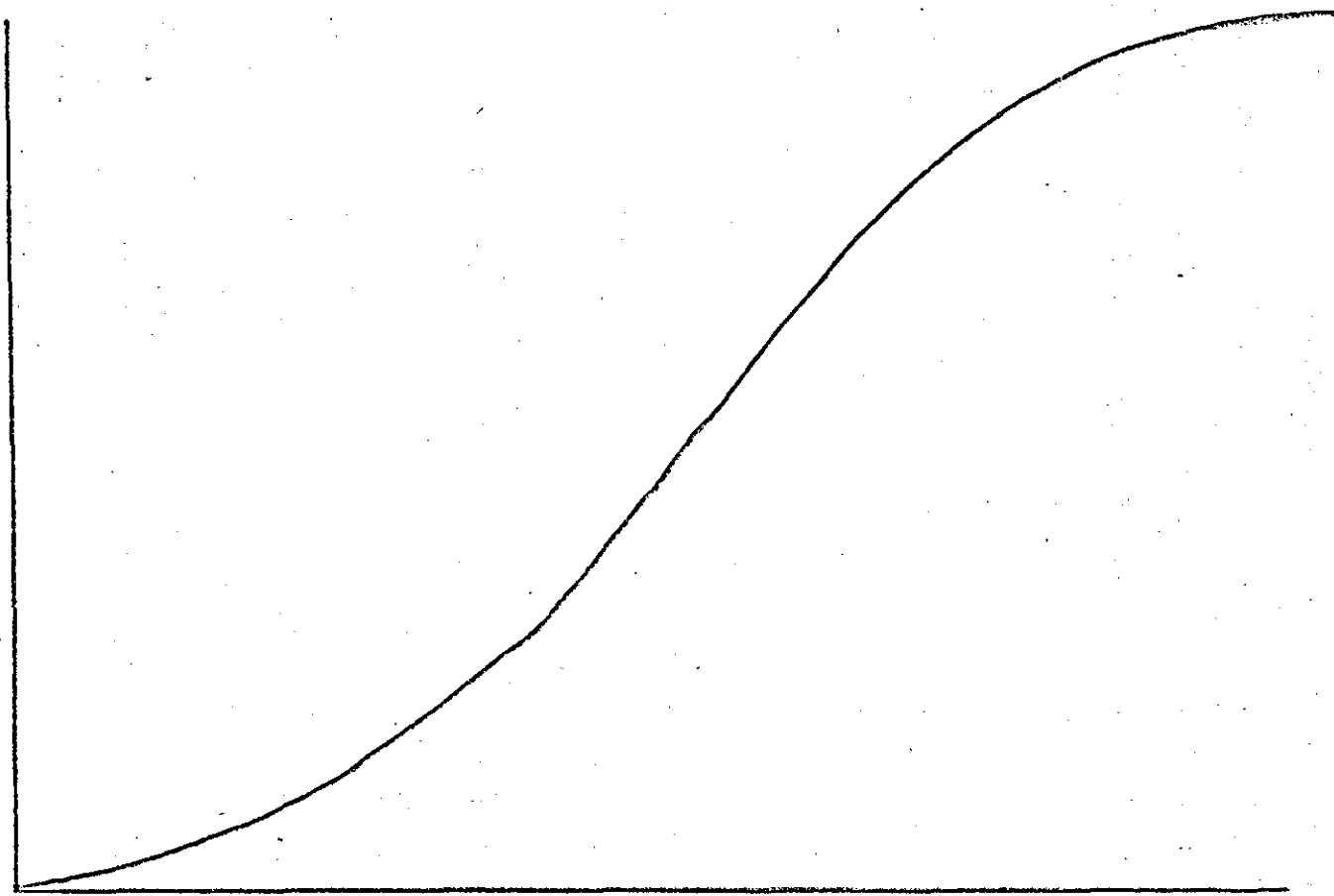
Note: The use of subjective probabilities in assessing risk and uncertainty is the subject of a recent paper published in the first issue of the Institute of Chartered Accountants' research publication (111).

over period of contract

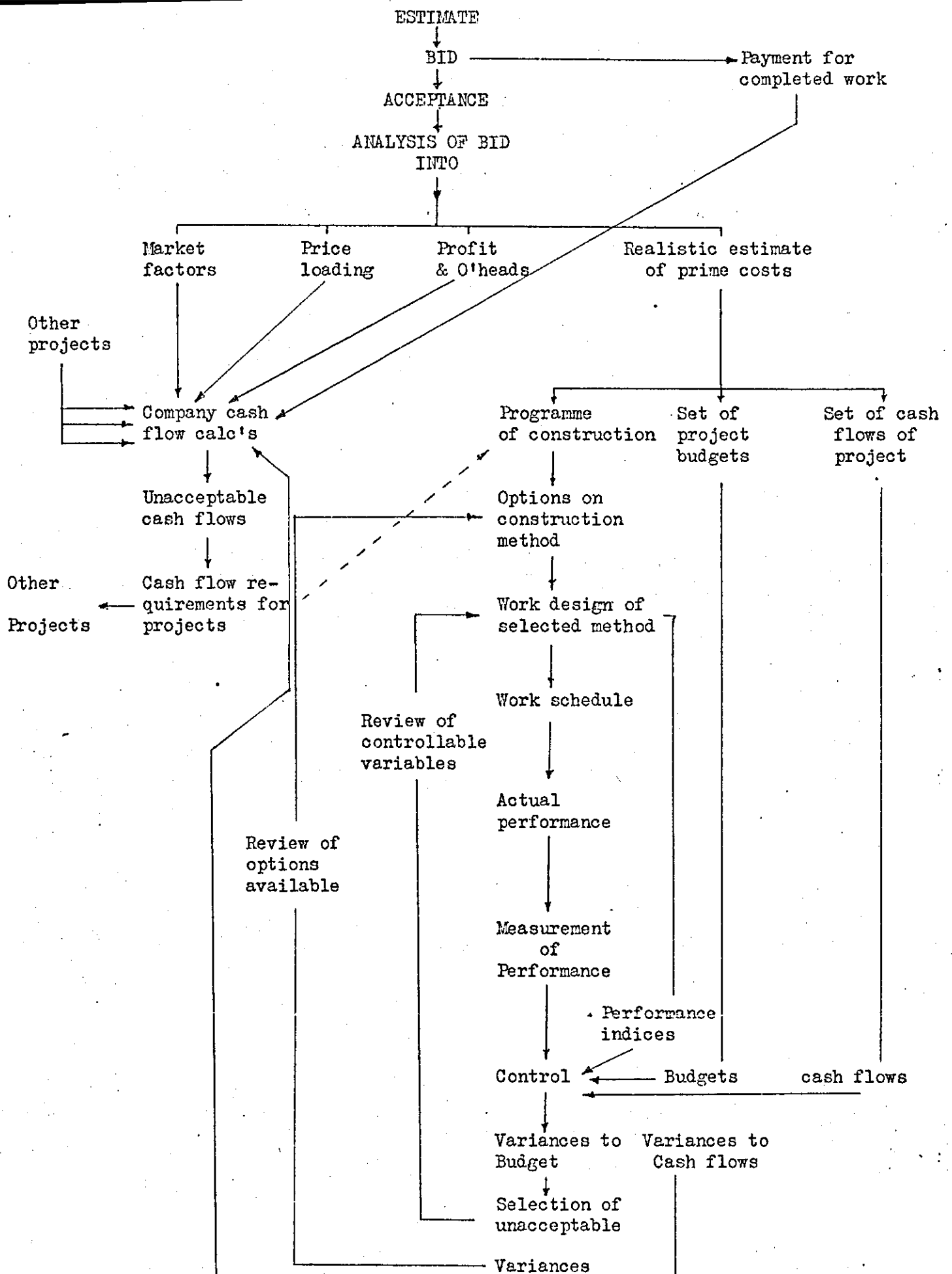


269

Costs
£



Time Period



Acknowledgement

P.MILLER - Research Fellow
Loughborough University.

APPENDIX 6

PROBABILITY THEORY

It is suggested that forecasts, e.g. sales forecasts, will tend to be more accurate when related to a probability factor, rather than stated as a "single valued" item, i.e. it is better to relate a range of possible sales to their relative estimated probability rather than categorically state a single "estimate", say £500,000, as against e.g.

<u>Possible Sales</u>	<u>Estimated Probability</u>	<u>Weighted Amount</u>
(S) £	(P)	(= S x P) £
300,000	.1	30,000
400,000	.1	40,000
500,000	.4	200,000
600,000	.2	120,000
700,000	.2	140,000
		<u>£ 530,000</u>

∴ Expected Value = £530,000

(i.e. The level of sales expected to be attained in period under consideration)

Although businessmen do not find it easy to state their forecasts in the form of probability distributions, their personal experience reflected to a certain extent in historical data should stand them in good stead.

Note: Although bidding strategy is outside the scope of this thesis, an authoritative reference is included in the bibliography (31).

FLEXIBLE BUDGETING

A flexible budget is one which, by recognising the difference between fixed (F), semi-fixed (S) and variable (V) costs, is designed to change in relation to the level of activity attained.

Therefore, if a flexible budget is required for a particular level of activity the following (simplified) formula may be applied:-

$$\text{Flexible Budget (£)} = F + (UV \times Q)$$

$$\text{Where } F = \text{Fixed Costs}$$

$$UV = \text{Unit variable costs (i.e. variable costs per unit of output)}$$

$$Q = \text{level of activity}$$

Therefore, given in a particular situation -

$$\text{Fixed Costs (F)} = \text{£5,000}$$

$$\begin{array}{l} \text{Unit variable costs} \\ \text{(UV)} \end{array} = \text{£100}$$

$$\begin{array}{l} \text{Level of activity} \\ \text{(Q)} \end{array} = \text{80 units}$$

$$\begin{aligned} \text{Flexible Budget (£)} &= F + (UV \times Q) \\ &= \text{£5,000} + (\text{£100} \times 80) \\ &= \underline{\underline{\text{£13,000}}} \quad \text{X} \end{aligned}$$

X This figure will then be compared with the actual spending at the actual level of activity (Q).

TYPES OF STANDARD COST

Prior to the completion of a quotation for a particular job, most companies complete a cost estimate which will tend to be based upon historical records.

Most standard costs, however, particularly those in the more sophisticated applications, tend to be based on works study techniques and as a result are usually more accurate than cost estimates. (Another difference is that the cost estimate is not often used as a basis for comparison and control, whereas this aspect is vital to the technique of standard costing.)

A normal (or average) standard cost is usually used as a basis for calculating a selling price; where work study is not possible, it is suggested that a "historical" standard cost could be used, e.g. the most frequently occurring historical measurement of cost (= mode) could be used as a "standard cost". This approach is to be preferred to having no standard cost as a basis for quotation and control purposes. (See Appendix 33 for further elaboration.)

DISCOUNTED CASH FLOW TECHNIQUE -

Present Value Factors at 20%

<u>Years</u>	<u>Present Value of £1 @ rate of 20%</u>	
1	.833	X
2	.694	
3	.579	
4	.482	
5	.402	
6	.335	
7	.279	
8	.233	
9	.194	
10	.162	

X Rate used by way of example in text; income of subsequent years would be discounted at appropriate diminishing rate.

THE APPLICATION OF MANAGEMENT ACCOUNTANCY TECHNIQUES

TO THE CONSTRUCTION INDUSTRY

PRELIMINARY QUESTIONNAIRE

Do you consider the following techniques are applicable to the Industry? (please tick and comment in appropriate columns)	YES	Suggested area(s) of application	NO	Indicate reason(s) for impracticability.
<ul style="list-style-type: none">1. Internal Audit.2. Marginal Costing.3. Break-even Analysis.4. Long-term forecasting (say 5 year periods).5. Budgetary Control (say 1 year period).6. Standard Costing.7. Capital Project Assessment.8. Ratio Analysis - internal.9. Uniform Costing.10. Inter-firm Comparison.				

The Application of Management Accountancy Techniques
to the Construction Industry

PRELIMINARY QUESTIONNAIRE COMPLETED BY QUANTITY SURVEYORS *

		<u>Number</u>
QUESTIONNAIRES CIRCULATED	-	39
" RETURNED	-	35
RESPONSE	-	89%

Summary of replies

Do you consider the following techniques are applicable to the Industry?

	YES (%)	NO (%)	UNDECIDED (%)	
Internal Audit	78	9	13) Totals = 100%
Marginal Costing	88	12	-	
Break-even Analysis	68	20	12	
Long-term forecasting (say 5 yr. periods)	69	31	-	
Budgetary Control (say 1 year period)	100	-	-	
Standard Costing	68	29	3	
Capital Project Assessment	86	11	3	
Ratio Analysis - internal	74	20	6	
Uniform Costing	43	49	8	
Inter-firm Comparison	43	51	6	

* Members of the Ministry of Public Building and Works' Post Qualification Training Courses (Accountancy and Investment Appraisal) in July 1969 and March 1970 at Loughborough University of Technology (Department of Civil Engineering)

AN APPRAISAL OF MANAGEMENT ACCOUNTANCY IN THE CONSTRUCTION INDUSTRYCONFIDENTIAL QUESTIONNAIREPART AGENERAL1. Name and address of firm2. Extent of activities - (please (1) tick - where appropriate and
(2) mark P - where prefabricated
units used.)

- (a) Motorways,
- (b) Roads,
- (c) Schools,
- (d) Houses,
- (e) Multi-storey buildings, incl. flats,
- (f) Tunnels,
- (g) Bridges,
- (h) Other activities - please add.

3. Share Capital

Authorized,

Issued.

— 4. Capital Employed (= Total Assets - as per latest Balance Sheet)
(i.e. Fixed Assets + Trade Investments + Current Assets.)5. Sales Revenue (as per latest Revenue Account.)— 6. Number of employees (please tick - where appropriate.)

- 1 - 59
- 60 - 299
- 300 - 1,199
- 1200+

— 7. Results of SurveyDo you wish to receive a Summary of the various
statistics, etc.?

YES/NO.

PART B TO BE COMPLETED BY HIGHER/GENERAL MANAGEMENT,
e.g. Director i/c Contract

اجتال
1. Professional Qualifications (Degree(s))

2. Accounting Information

What information do you need and how often (weekly, monthly, quarterly)?

<u>Type</u>	<u>Frequency</u>
-------------	------------------

Are you generally satisfied with the type and frequency of accounting information you receive? YES/NO.

If not, please suggest area(s) for improvement.

3. Tenders

How often does your company submit dual tenders? (i.e. one based on details submitted by customer's consulting engineer, and one related to your own interpretation of the particular contract.)

⁺ If so, please give examples

Please tick

⁺ Often

Infrequently

Never

What percentage of your tenders are accepted? %

- (a) Motorways,
- (b) Roads,
- (c) Schools,
- (d) Houses,
- (e) Multi-storey buildings, incl. flats,
- (f) Tunnels,
- (g) Bridges,
- (h) Other activities.

TOTAL % accepted

%

PART B3. Tenders (contd.)

Do you employ standard costs as a basis for:-

(a) price-fixing of tenders YES/NO.

(b) control of costs as contract proceeds YES/NO.

How are these standard costs calculated?

By reference to:-

a. work study measurements YES/NO.

b. historical costing data YES/NO.

c. historical mode, i.e. most frequently
occurring historical cost of same/
similar work. YES/NO.

(c) regular cost analyses published in:-

i. The Architect's Journal YES/NO.

ii. The Chartered Surveyor YES/NO.

iii. The Builder. YES/NO.

4. EstimatingWhat is the extent of feed-back information
to estimators in respect of current jobs?Please tickExtensive
Occasional
NilDo estimators use this information for current
estimating of future contracts? YES/NO.Do estimators accumulate this information for
guidance in the compilation of future estimates? YES/NO.5. Development of Management Accountancy TechniquesCan you briefly indicate whether and how the various
organizations are encouraging the use of management
accountancy techniques.OrganisationsExtent of influenceConstruction Industry Training
Board.

Professional Institutes.

Universities.

Colleges of Technology.

6. Further Research

Please indicate your willingness or otherwise in regard to:-

(a) accepting a follow-up visit, if necessary YES/NO.(b) participating in a practical case-study on,
e.g. standard and/or marginal costing. YES/NO.

PART C . TO BE COMPLETED BY A SITE MANAGER(1) Professional Qualifications/Degree(s).(2) Accounting information.

What information do you need and how often (daily, weekly, monthly, quarterly)?

TypeFrequency

Are you generally satisfied with the type and frequency of accounting information you receive? YES/NO.

If not please suggest area(s) for improvement.

(3) General

Please state your order of priorities in regard to the execution of a contract, (i.e. 1st, 2nd, 3rd).

Technical considerations

Financial implications

Speed of execution

PART D TO BE COMPLETED BY A SITE FOREMAN

(e.g. i/o joinery, i/o excavation)

(1) Professional Qualifications/Degree(s)(2) Accounting Information

What information do you need and how often (daily, weekly, monthly, quarterly)?

TypeFrequency

Are you generally satisfied with the type and frequency of accounting information you receive? YES/NO.

If not, please suggest area(s) for improvement, e.g. written information from accountant, rather than verbal information from site manager.

PART E TO BE COMPLETED BY THE ACCOUNTANT

(1) Professional Qualifications/Degree(s)

(2) Role in Company (Please Tick)

Financial Steward

Financial Adviser

(3) Experience

Time spent in other industries as % of total working
life to date. (Please tick)

approx. %

25

50

75

100

(4) Management Accountancy Techniques

Would you please indicate (over):-

- a. the extent to which the following techniques
 are used by your firm, *
- b. any development which has been possible by
 practical application, and,
- c. any benefits resulting from their use.

* N = NIL
 L = Limited
 E = Extensive

In addition, could you add the details of any other
management accountancy technique used by your company?

<u>Name of Technique</u>	<u>Utilisation of Technique</u> (please tick)			Area(s) of Application, development and benefits	If <u>not</u> used, state reason(s) for impracticability
	N.	L.	E.		
Internal Audit					
Marginal Costing					
Break-Even Analysis					

Name of Technique	Utilisation of Technique (please tick)			Area(s) of Application, development and benefits	If <u>not</u> used, state reason(s) for impracticability
	N.	L.	E.		
Long-term forecasting (say 5 year periods)					
Budgetary Control (say 1 year periods) in respect of, (a) <u>all</u> aspects of business (b) site control, (c) cash control.					
Standard Costing					

<u>Name of Technique</u>	<u>Discounted Cash Flow Applied</u> (please tick)	<u>Utilisation of Technique</u> (please tick)			Area(s) of Application, development and benefits	If <u>not</u> used, state reason(s) for impracticability
		N.	L.	E.		
<u>Capital Expenditure Project Assessment</u>						
(a) <u>Pay Back Method</u>						
(b) % Original Investment						
(c) % Average Invest- ment						

<u>Name of Technique</u>	<u>Utilisation of Technique</u> (please tick)			Area(s) of Application, development and benefits	If <u>not</u> used, state reason(s) for impracticability
	N.	L.	E.		
Internal Ratio Analysis					
Inter-firm Comparison (incl. Uniform Costing)					
Other Techniques					

The Application of Management Accountancy Techniques
to the Construction Industry

DETAILED QUESTIONNAIRE COMPLETED BY ACCOUNTANTS AND
MANAGEMENT ASSOCIATED WITH INDUSTRY *

Coverage and response

		<u>Number</u>
A	Questionnaires Circulated	<u>53</u>
B	Replies (Total)	<u>27</u>
$\left\{ \frac{B}{A} \times \% \right\}$	Total Response = <u>50.9%</u>	
B	Replies (Total)	<u>27</u>
C	NIL Replies (i.e. unable to give information because of re-organisation, etc.)	<u>9</u>
(D = B-C)	Effective Replies	<u>18</u>
$\left\{ \frac{D}{A} \times 100\% \right\}$	∴ Effective Response = <u>33.9% φ</u>	

* Qualified members of the accountancy profession and managers and accountants with experience of the industry.

{ Bearing in mind the nature of the enquiry, the response }
{ compares very favourably with the 17% attained by J. Batty }
{ (8). }

The Application of Management Accountancy Techniques
to the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

PART A - THE COMPANY

Nature and extent of activities

	<u>% of respondents involved</u>
a) Motorways	11%
b) Roads	23%
c) Schools	56% ^N
d) Houses	89% ^N
e) Multi-storey buildings, incl. flats	83% ^N
f) Tunnels	17%
g) Bridges	22%
h) Other activities	39%

(^N 6% of respondents make use of prefabricated units)

Number of Employees

<u>No. employed</u>	<u>% of respondents</u>
1 - 59	22%
60 - 299	28%
300 - 1199	33%
1200 +	17%

The Application of Management Accountancy Techniques
to the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

PART B - HIGHER MANAGEMENT e.g. Director of Contracts

<u>Professional Qualifications/Degrees</u>	<u>% of respondents</u>
Engineering	17%
Accountancy	6%
Surveying	6%
Building	22%
No Qualifications	44%

Accountancy Information Needs

Daily

Liquidity statements, e.g. cash flow summary	6%
Overdue certificates	6%

Weekly

Contract costs - labour only	11%
Contract (site) costs - total (actual, or actual v. estimate)	11%
Contracts received (i.e. tenders accepted by clients)	6%

Monthly

Contract (site) - costs only	22%
" " - costs and profits (actual or actual v. estimate)	56%
Cash Flow Statement	11%
Overhead Recovery	5%

Quarterly

Contract (Site) Costs v. Profits - (Actual)	11%
---	-----

Accounting Information Needs (continued)

<u>Quarterly (contd.)</u>	<u>% of respondents</u>
Overhead Analysis (costs v. charged to contracts)	11%
Professional Fees	6%
Cash Position	6%
Capital Expenditure (incl. Plant Hire)	11%
Profit and Loss Account and Balance Sheet	11%
<u>Upon Completion of Contract</u>	
Costs and Profits	17%

Satisfaction with type/frequency of information received

YES	67%
NO	33%

The Application of Management Accountancy Techniques
to the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

PART C - SITE MANAGER

<u>Professional Qualifications/Degree</u>	<u>% of respondents</u>
Engineering	11%
Surveying	6%
Building	22%
H.N.C.	11%
No qualifications	50%

Accounting Information Needs

Daily

Material and/or labour contract costs	17%
---------------------------------------	-----

Weekly

Total contract (site) costs - actual or actual v. estimate	33%
Total contract (site) costs and values - or actual v. estimate	22%

Monthly

Total contract (site) costs - actual or actual v. estimate	6%
Total contract (site) costs and values - or actual v. estimate	44%
Labour efficiency statement	6%

Satisfaction with type/frequency of information received

YES	67%
NO	28%
(Nil response)	5%

Contract Priorities

	1st	2nd	3rd	
a) Technical considerations	50%	-	22%	
b) Financial implications	17%	56%	-	
c) Speed of execution	6%	17%	50%	
a), b), c) of equal importance				17%
Nil response				11%

The Application of Management Accountancy Techniques
to the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

PART D - SITE FOREMAN

<u>Professional Qualifications/Degree</u>	<u>% of respondents</u>
City & Guilds/HNC	11%
No qualifications	89%

Accounting Information Needs

Weekly

Labour cost/value comparisons	11%
Total " " "	6%

Monthly

Contract labour costs	6%
-----------------------	----

(nil requirement = 78%¹)

Satisfaction with type/frequency of information received

YES	83% ¹
NO	11%
(Nil response)	6%

THE SITE FOREMAN AND ACCOUNTING INFORMATIONVisits to Construction SitesIntroduction

In order to complement the completed questionnaires and visits to the various companies, additional visits were made to sites of different size and type in order to substantiate (or otherwise) the significance of the site foreman within the accountancy information system.

Site X

(A complex civil engineering contract with a value approaching £10M.)

The foremen did not receive written information; verbal instructions from the "project" manager were considered sufficient, particularly in view of the weekly site meeting which was held in order to consider the progress of the contract. (Although the amount of information given to foremen will vary according to the approach of the individual manager, it is generally appreciated that a project is more likely to succeed if relevant information is forthcoming from the manager, e.g. labour and material content.)

The "division" between site management and men is less apparent than in other industries because of the nature of the industry and the geographical environment of contract work: teamwork (and loyalty) is essential for the fulfilment of each project.

Site Y.

(A small house-building project with a value of approximately £300,000).

The foreman in charge of excavation is given the full details

of the previous site investigation so that he is able to apply his technical expertise to the different areas on site.

Throughout the building operation, the various foremen have access to the house specifications in the site office and therefore are able to continually gauge and discuss with the site manager the actual input (in terms of quantity only) of manpower and materials; on such a relatively small site this procedure seems sufficient without undue duplication/circulation of accounting information.

Conclusion

Irrespective of the size of a contract, it would seem that the close relationship between site manager and foremen offsets the need for circulation of written accounting information at the supervisory level of management.

The Application of Management Accountancy Techniques
in the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

<u>Tenders</u>		<u>% of respondents</u>
Submission of dual tenders:		
Often		6%
Infrequent		33%
Never		56%
(Nil response		6%)
Percentage of tenders accepted:		
10% - 14%		17%
15% - 19%		33%
20% - 24%		22%
24% and above		6%
(Nil response		22%)
Use of standard costs:		
(a) price fixing	YES	50%
	NO	50%
(b) contract cost control	YES	83%
	NO	17%
Calculation of standard costs based upon:		
(a) work study measurements	YES	28%
	NO	72%
(b) historical costing data	YES	78%
	NO	22%
(c) historical mode	YES	33%
	NO	67%
(d) published costs	YES	11%
	NO	89%
<u>Estimating</u>		
Extent of feed-back to estimators:		
Extensive		44%
Occasional		50%
Nil		6%
Used in <u>current</u> estimating	YES	72%
	NO	28%
" " <u>future</u> "	YES	89%
	NO	11%

The Application of Management Accountancy Techniques

in the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

Development of Techniques

Influence of Organisations

<u>Organisation</u>	<u>Extent of Influence</u>	
	<u>Extensive/Some</u>	<u>Little/None</u>
C.I.T.B.	22%	78%
Professional Institutes	28%	72%
Universities and Colleges of Technology	11%	89%

Further Research

	<u>% of respondents</u>	
(a) Follow-up visit	YES	67%
	NO	33%
(b) Practical case study participation	YES	39%
	NO	61%

The Application of Management Accountancy Techniques
to the Construction Industry

SUMMARY OF REPLIES TO DETAILED QUESTIONNAIRE

PART E - THE ACCOUNTANT

<u>Professional Qualifications/Degrees</u>	<u>% of respondents</u>
Chartered	33%
Cost and Works	22%
Certified and Corporate	6%
No qualification	17%
None employed/external auditor	22%

Role in Company

Financial Steward	61%
" Adviser	39%

Experience of other industries (including periods in practice)

Time in other industries
 (% of working life to
 date)

NIL	11%
25%	33%
50%	17%
75%	11%

USE OF TECHNIQUES

Analysis according to the size of firms covered by the survey

Technique \ Size of firm	1 - 59			60 - 299			300 - 1199			1200 +			Total			1-59 & 1200 ⁺		
	L	E	T	L	E	T	L	E	T	L	E	T	L	E	T	L	E	T
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Internal Audit	25	-	25	20	20	40	50	17	67	-	100	100	28	28	56	14	43	57
Marginal Costing	-	-	-	20	40	60	50	-	50	-	-	-	22	11	33	-	-	-
Break-even Analysis	25	-	25	20	20	40	33	-	33	100	-	100	38	6	44	57	-	57
Long-term Forecasting	25	-	25	40	-	40	-	33	33	67	33	100	28	17	45	43	14	57
Budgetary Control																		
(a) all aspects of business	25	-	25	40	20	60	-	67	67	-	100	100	17	44	61	14	43	57
(b) site control	25	-	25	20	20	40	17	83	100	33	67	100	22	44	66	29	28	57
(c) cash control	-	25	25	20	80	100	17	83	100	-	100	100	11	72	83	-	57	57
Standard Costing	50	-	50	20	60	80	50	50	100	33	67	100	39	44	83	43	28	71
Capital Expenditure Project Assessment																		
(a) Pay-back Method	-	-	-	-	-	-	50	17	67	67	33	100	28	11	39	29	14	43
(b) % Original Investment	-	-	-	-	-	-	17	-	17	33	-	33	11	-	11	14	-	14
(c) % Average Investment	-	-	-	-	-	-	17	17	34	33	-	33	11	6	17	14	-	14
(Discounted Cash Flow applied)	-	-	-	-	-	-	-	-	-	67	-	67	11	-	11	29	-	29
Internal Ratio Analysis	25	-	25	20	-	20	33	50	83	67	33	100	33	22	55	43	14	57
Inter-firm Comparison	-	-	-	20	-	20	17	-	17	67	-	67	22	-	22	29	-	29
Other Techniques	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

L = Limited Use
 E = Extensive Use
 T = Total Use
 (= L + E)

USE OF TECHNIQUES

Weighted Projection-using inter-relationship between
usage indicated by survey and structure of industry.
(including supplementary comparison - (51)^W)

Technique \ Size of firm (% of industry)	1 - 59 (= 96.2%)		60 - 299 (= 3.2%)		300 - 1199 (=.5%)		1200 ⁺ (= .1%)		TOTAL USE (Wtd.)	GENERAL INDUSTRY (Wtd.)
	Usage (%) Actual Wtd.		Usage (%) Actual Wtd.		Usage (%) Actual Wtd.		Usage (%) Actual Wtd.		W %	%
Internal Audit	25	24	40	1.3	67	.3	100	.1	26	28
Marginal Costing	-	-	60	1.9	50	.3	-	-	2	12
Break-even Analysis	25	24	40	1.3	33	.2	100	.1	26	8
Long-term Forecasting	25	24	40	1.3	33	.2	100	.1	26	16
Budgetary Control										
(a) all aspects	25	24	60	1.9	67	.3	100	.1	26	24
(b) site control	25	24	40	1.3	100	.5	100	.1	26	
(c) cash control	25	24	100	3.2	100	.5	100	.1	28	
Standard Costing	50	48	80	2.6	100	.5	100	.1	51	12
Capital Expenditure Project Assessment										
(a) Pay Back	-	-	-	-	67	.3	100	.1	-	24
(b) % Original Investment	-	-	-	-	17	.1	33	-	-	
(c) % Average Investment	-	-	-	-	34	.2	33	-	-	
(Discounted Cash Flow applied)	-	-	-	-	-	-	33	-	-	
Internal Ratio Analysis	25	24	20	.6	83	.4	55	-	25	20
Inter-firm Comparison	-	-	20	.6	17	.1	67	-	1	12
Other Techniques	-	-	-	-	-	-	-	-	-	

Weighted Comparison between Construction Industry and industry in general (51)

100%

90%

80%

70%

60%

50%

40%

30%

20%

10%

General Industry

Construction Industry

1 2 3 4 5 6 7 8 9

* For 'LEGEND'
see PAGE 298

* In contrast to other industries, even the small contractor attempts some form of "standard costing"; also the term is used in relation to site control, i.e. the terms "standard cost" and "budget" tend to be inter-changeable. (see Part V)

SURVEY OF PUBLISHED ACCOUNTS 1968-69

(The General Educational Trust
of the Institute of Chartered
Accountants in England & Wales)

PROFIT INCLUSION

John Laing & Son Ltd.

31st December 1968

Notes on the accounts:

TURNOVER. Trading turnover for 1968 was £99 million, a similar total to that for 1967. It comprises contract progress receipts and invoiced sales after excluding inter-company transactions. Profits of the year do not relate directly to this turnover since, although provision is made for losses incurred, no account is taken of profit on contracts unfinished at the end of the financial year.

George Wimpey & Co. Ltd.

31st December 1968

Extract from consolidated balance sheet:

Work in progress at cost (less cash received on account)
stocks, etc., at cost (less provisions) £29,207,193

Notes on consolidated profit and loss account:

Turnover. The total value of work executed during the year, including expenditure of clients' funds, was estimated at £200 million (1967 £190 million) and of this work the major proportion related to contracts not completed at the end of the year. The profit of the year relates only to contracts and developments completed during the current year.

SHORT-TERM (i.e. PROFIT TO SALES) PROFITABILITY

COMPARISON FOR 1968 (16)

Name of Company	Sales Turnover (S)	Pre-Tax Profit (P)	% Profit/Sales $\left(\frac{P}{S} \times 100\%\right)$
	£M	£M	
Taylor Woodrow	71	3.5	4.9%
George Wimpey	200	7.5	3.8%
John Laing	99	1.4	1.4%
"E" LTD.	34	.91	2.7% *

* See figure 33 - Summary of Consolidated Accounts for period of six years - which includes "Long-Term" Profitability Index,

$$\text{i.e. } \frac{\text{Group Profit}}{\text{Capital Employed}} \times 100\%$$

CONTRACT PROFIT CALCULATION

(for Company Profit and Loss A/c. inclusion)

Where a contract is uncompleted over a number of years, a proportion of profit may be credited to the Profit and Loss Account at the end of each financial year, by applying the following formula:-

$$\frac{2}{3} (x) \times \frac{C}{VC} \times P$$

where C = Cash received
 VC = Value of work certified
 & P = Profit

(x) Alternative proportions (say $\frac{1}{2}$) may be applied.

If no profit is taken, the year when a large contract is completed will show abnormally high profits as compared with other years: this could cause unwarranted fluctuation in dividends (where no dividend equalisation reserve and policy exists) which would tend to influence the market values of the company's shares. A conservative proportion of the profit may therefore be taken and credited to the Profit and Loss Account each year, but -

- (a) no profit should be taken unless the contract is sufficiently advanced,
- (b) profit should be taken only for work certified by architects, and,
- (c) the possibility of strikes, increased costs and other contingencies must be taken into account.

continued

Example - Contract S

	<u>£'000</u>
Value of work certified (VC)	200
Cost of work completed but uncertified	<u>20</u>
	220
less expenditure to date	<u>190</u>
<u>PROFIT (P)</u>	<u>£ 30</u>
(Cash Received (C))	£ 180)

∴ Proportion of profit taken to Profit and Loss Account should
not exceed:-

$$\frac{2}{3} \times \frac{C}{VC} \times P$$

$$\frac{2}{3} \times \frac{180,000}{200,000} \times 30,000$$

$$= \underline{\underline{£ 18,000}}$$

(Additional reference -
116)

F (CONTRACTORS) LTD.

Cost Sections

Timber Buildings Division Departments

301	General Unclassified
302	Joinery Shop
303	Derwent Assembly (Panels)
304	Sectional Buildings Assembly
305	Type 6 Assembly (Panels, Trusses, Floors)
306	Door and Window Manufacturing
307	Housing Assembly
308	Roof Manufacturing
309	Roof Felting
310	Painting Shop
311	Beam Manufacturing
312	Setting Out
313	Development
314	Posts
315	Type Four
316	Doors & Casings
326	Inspection

F (CONTRACTORS) LTD

Expense Classification

Wages and Salaries Section

- 501 Direct Wages (Hourly rates including plusages)
- 502 Direct Wages (Piecework and Incentive pay)
- 509 Outworkers Earnings
- 511 Indirect Labour and Supervision
- 512 Overtime Premiums
- 513 Wages Make-up
- 514 Variations on Piecework Rates, etc.
- 515 Rectification of faulty workmanship
- 516 Rectification of customers' own damages
- 517 Inspection Labour and Quality Control
- 518 Standing and Idle Time
- 519 Sundry Time
- Carriage & Transport of Materials, Components, Plant
and Equipment
- 541 Deliveries from Suppliers to the Factory
- 542 Factory Internal Movements
- 543 Deliveries to and from Sites and Customers
- 546 Jigs, Patterns and Templates
- 547 Tool Setting
- Repairs, Renewals, Maintenance and Minor Modifications
- 551 Property (Buildings and Adjuncts)
- 553 Plant and Machinery
- 554 Fixtures, Fittings and Office Equipment
- 557 General

continued

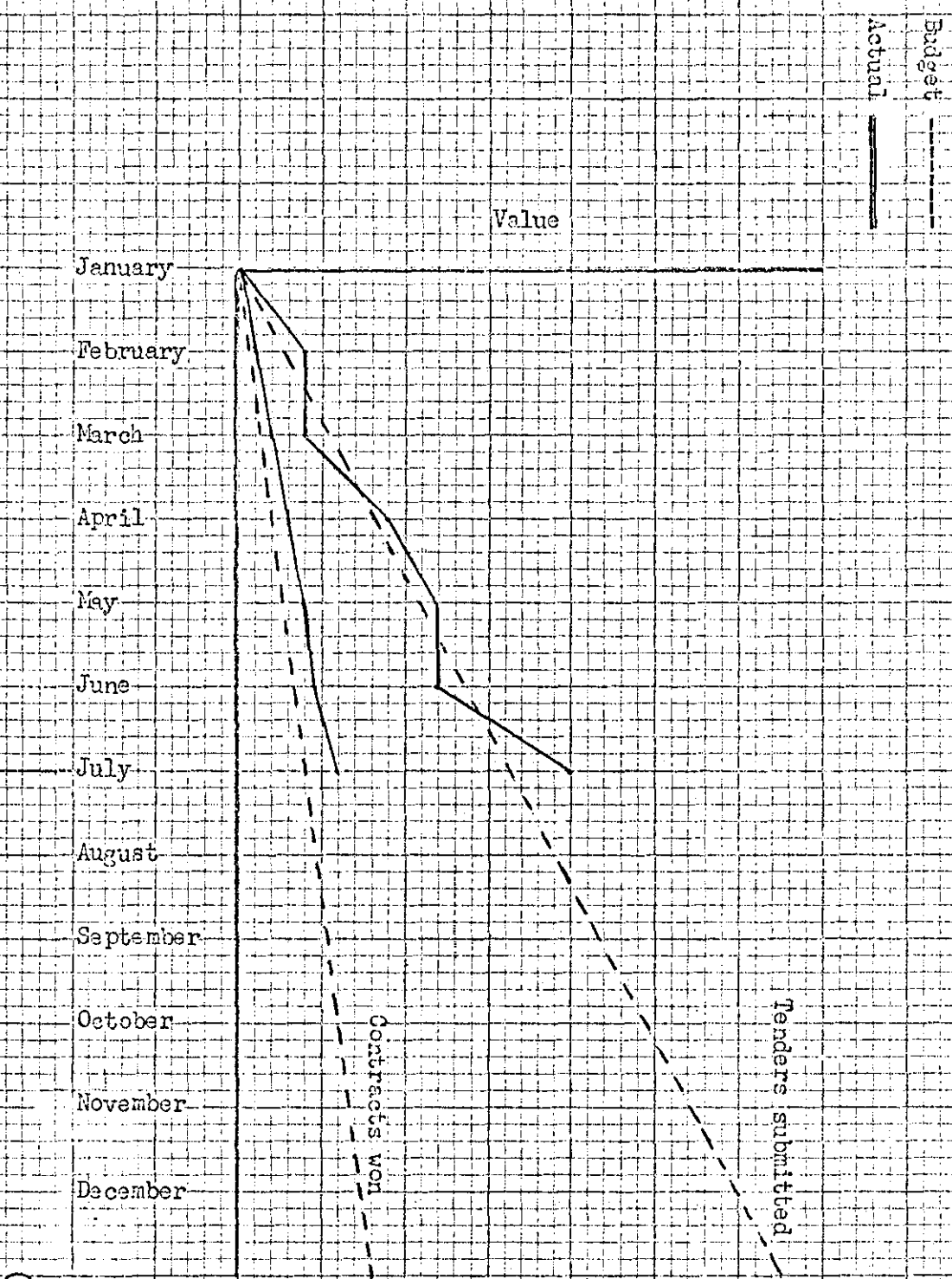
559	Tool and Clothing Allowances, etc.
	New erections and installations
561	Land and Property
562	Workshops and Buildings
563	Plant and Machinery
564	Fixtures, Fittings and Office Equipment
565	Loose Tools and Small Plant
566	Cars and Passenger Vehicles
567	Trucks and Commercial Vehicles
581	Cleaning
584	Training and Instructional Time (Instructors and Learners)
591	Experimental and Development Work
599	Pensions Payable

BUDGETARY CONTROL - CASH FLOW (1 - 3 month period)

	<u>CONTRACT A</u>	<u>CONTRACT B</u>	<u>CONTRACT C</u>	<u>TOTAL</u>
<u>BUDGETED</u>				
<u>CASH RECEIPTS</u>				
Payment 1				
" 2				
" 3				
Balance				
<u>TOTAL</u>	<u>100,000</u>	<u>200,000</u>	<u>400,000</u>	<u>£ 700,000</u>
<u>BUDGETED</u>				
<u>CASH PAYMENTS</u>				
Wages				
Materials				
Plant Hire				
etc.				
Contingencies				
<u>TOTAL</u>	<u>105,000</u>	<u>210,000</u>	<u>360,000</u>	<u>£ 675,000</u>
<u>BALANCE +</u>	<u>- 5,000</u>	<u>- 10,000</u>	<u>+ 40,000</u>	<u>+ £ 25,000</u>

Note: Although such a statement may initially be used to facilitate cash planning it may also prove useful if actual cash receipts and payments are incorporated during the contracts' period of completion; this will enable adverse (or other) trends to be anticipated and the appropriate action to be taken.

PROJECTION CURVE OF VALUES OF CONTRACTS SUBMITTED AND CONTRACTS WON.



(Reference 38)

CALCULATION OF STANDARD LABOUR COSTA More Refined Alternative to the
Historical Mode("The Three Estimate Technique")

Let L = Lowest (historical) cost

H = Highest " "

M = most likely cost

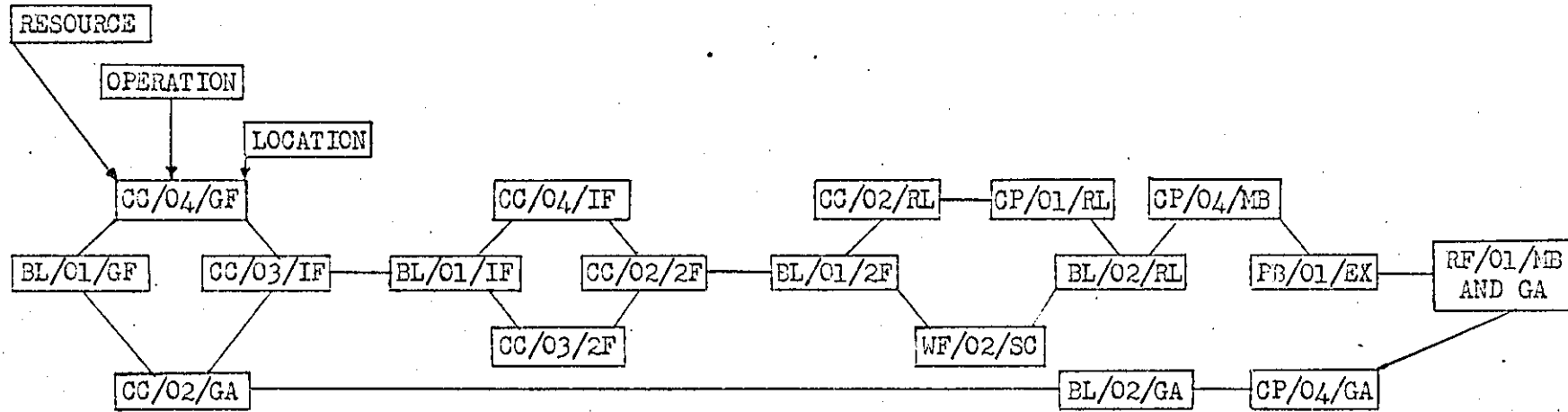
$$\therefore \text{Expected Standard Cost} = \frac{L + H + 4M}{6}$$

Example L = 50 man-hours
 H = 60 " "
 M = 56 " "

$$\begin{aligned} \therefore \text{Expected Standard Costs} &= \frac{50 + 60 + 224}{6} \\ \text{(in hours)} & \\ &= \underline{\underline{55.6 \text{ man-hours}}} \end{aligned}$$

N.B. ⁿ Probability Factor The effort of carrying out the probability calculations is not repaid by the increased degree of accuracy obtained.

A PRECEDENCE DIAGRAM



Precedence diagram showing an operational sequence for building the structural shell of a three-storey block of flats in load-bearing brickwork. It illustrates the logical order of construction as dictated by the drawings; this is only a guide, not an instruction to the builder to carry out the work in this order. Accordingly, the numbering used is flexible (87: alternative = 93)

BL BRICKLAYER

01 LOAD BEARING WALLS
02 BEAM FILLING
03 NON LOAD BEARING WALLS

CC CONCRETOR

01 CONCRETE IN FOUNDATIONS
02 BEAMS AND KERES
03 SLABS AND FLOORS
04 STAIRCASE AND LANDING

CP CARPENTER

01 JOISTS
02 STAIRCASE
03 FLOORING
04 ROOF TIMBERS

PB PLUMBER

01 RAINWATER PIPES

WF WINDOW FIXER

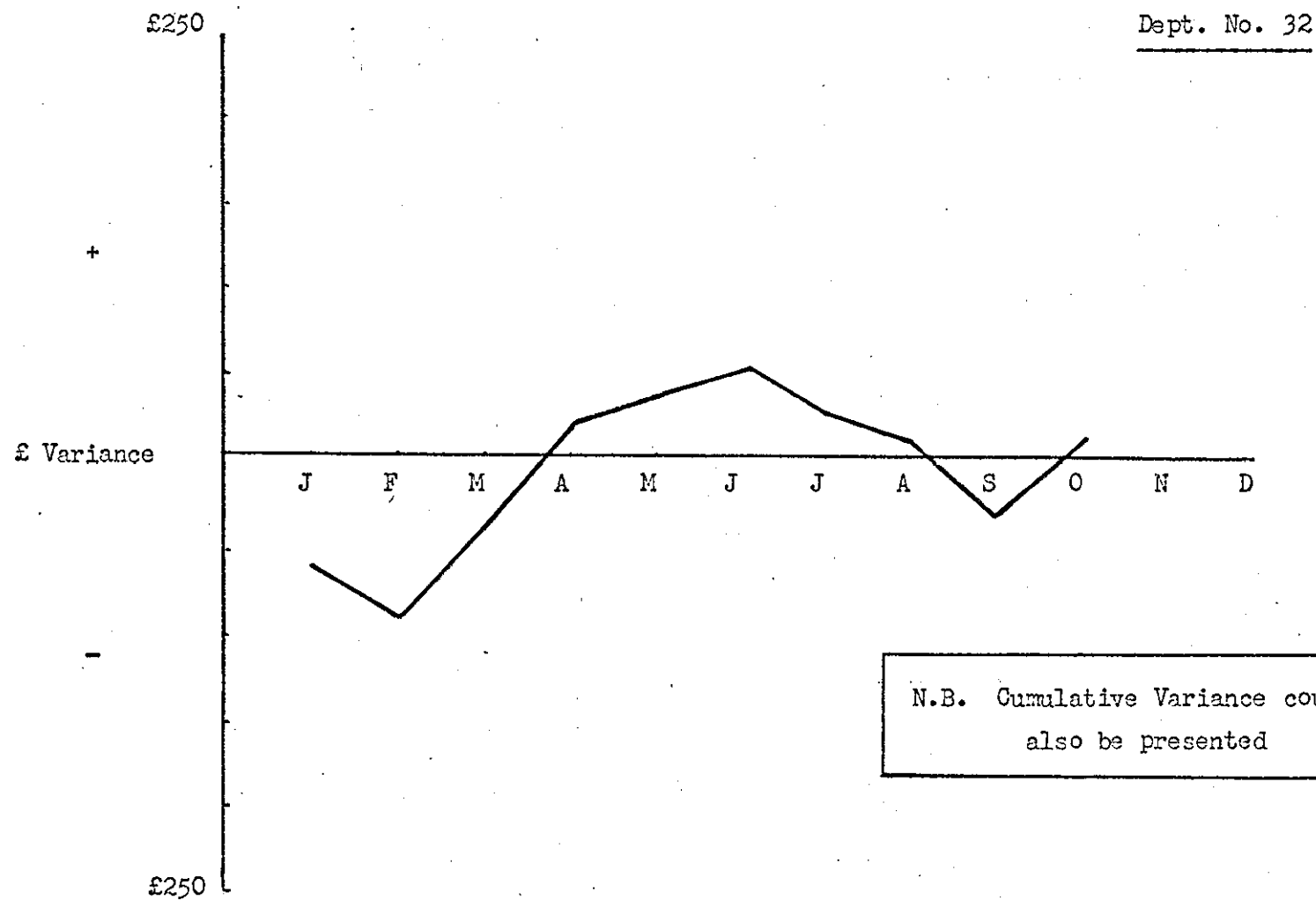
01 FIX FRAMES
02 CURTAIN WALLING

RF ROOFER

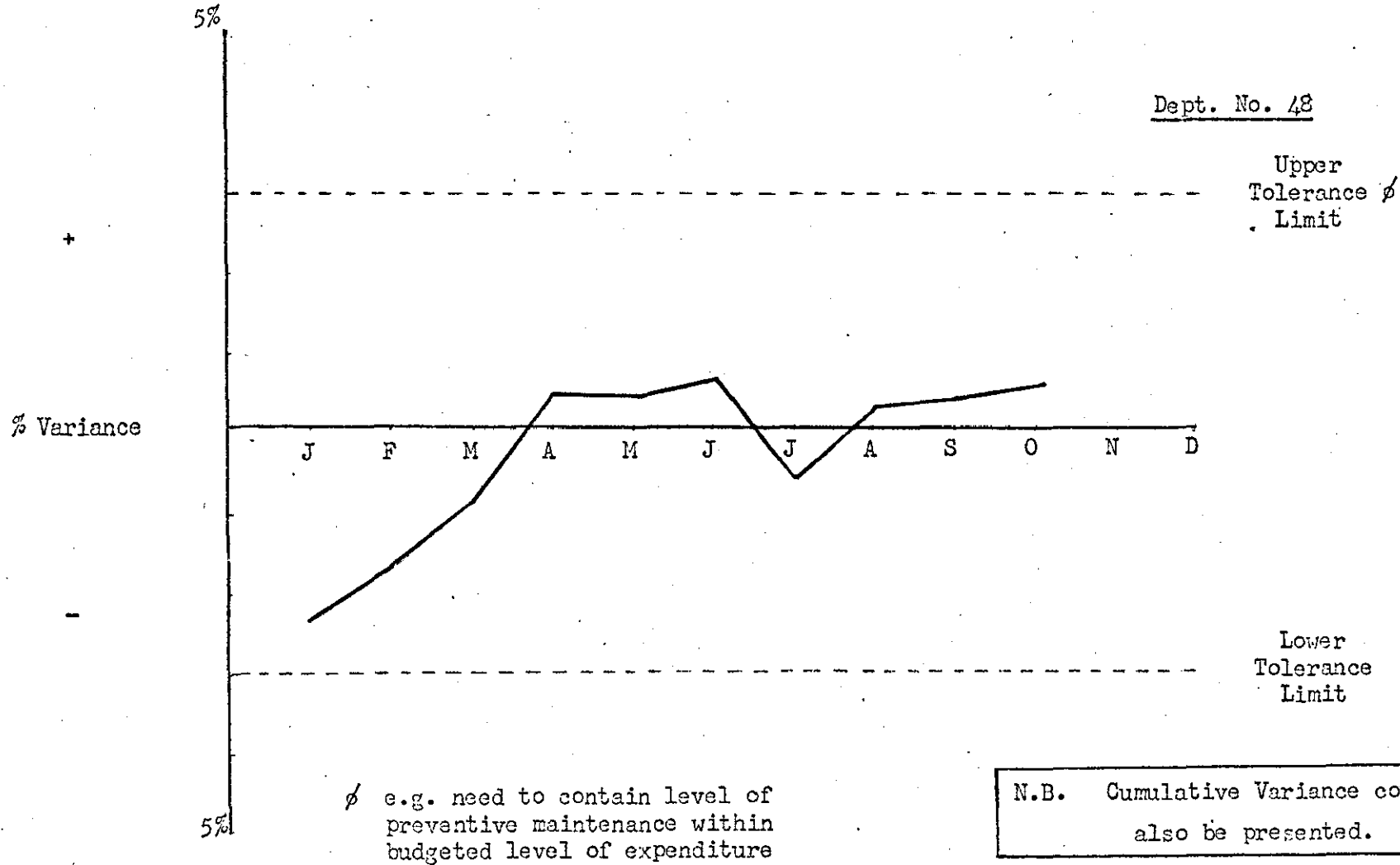
01 ROOF COVERING

LOCATIONS

GF GROUND FLOOR
1F FIRST FLOOR
2F SECOND FLOOR
RL ROOF LEVEL
MB MAIN BLOCK
GA GARAGES
EX EXTERNAL
SC STAIRCASE



(including tolerance limits *)



* The determination of tolerance limits creates difficulties and therefore statistical techniques should be employed for a more accurate result (see 'significant variances') (112)

CONTRACT COST CONTROL STATEMENT

6 months to 30th June

Operation		Total Standard Costs (June)	Actual Costs (June)					Variances (June)					Total Standard Costs (Jan.-June)	Actual Costs (Jan.-June)					Variances (Jan.-June)				
Description	Code		L	M	P	S	Total	L	M	P	S	Total		L	M	P	S	Total	L	M	P	S	Total
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Excavate (example)													5,600	3,100	2,200	400		5,900	- 100	-	- 200	-	- 300
														L = Labour M = Material P = Plant S = Other Site costs									

PROFIT AND LOSS STATEMENT INCORPORATING
BUDGETARY CONTROL AND STANDARD COSTING

XYZ LTD.

PERIOD

	CONTRACT I [£]	CONTRACT II [£]	TOTAL £
Budgeted Capital Employed (1)			1,000,000
Budgeted Contract Values (1)			3,000,000
less Contracts which did not materialise (2)			500,000
Actual Contract Values	2,000,000	500,000	2,500,000
less Standard Costs (3)	1,900,000	475,000	2,375,000
= Budgeted Profit on Actual Contracts	100,000	25,000	125,000
+ Variances (4)			
Material - price and usage)			
Site Costs - " " ")			
Labour - rates and efficiency) (5)	- 24,000	- 1,000	- 25,000
Plant - " " ")			
Fixed overheads - expenditure and volume (2))			
= Actual Profit	£ 76,000	£ 24,000	£ 100,000

See notes overleaf

Notes:

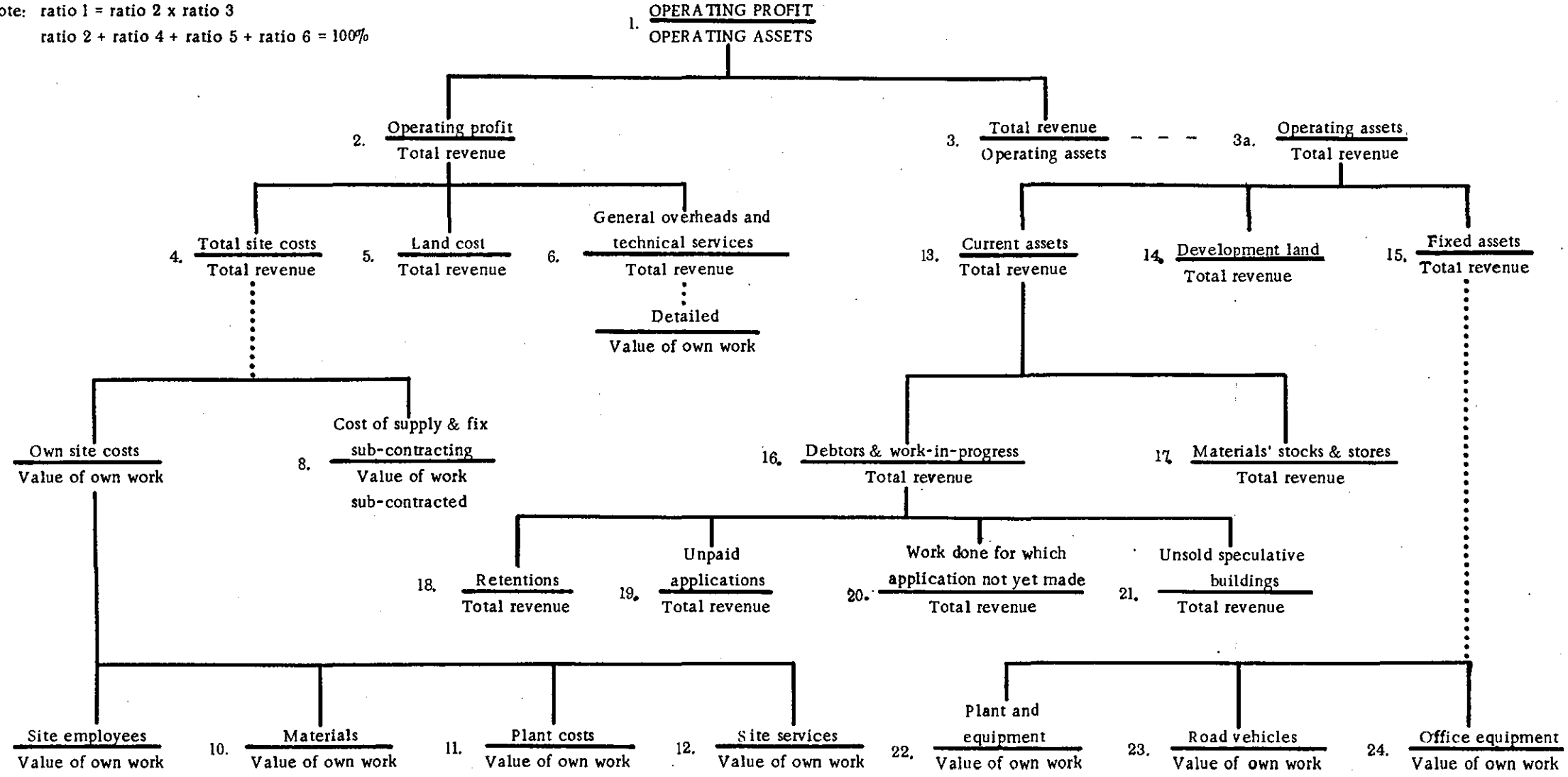
		£
(1)	a) Budgeted Capital Employed	1,000,000
	b) " Contract Values	3,000,000
	c) " Profit	150,000
	$\frac{c}{a} \times 100\% = 15\%$	} Budgeted Profitability Measures
	$\frac{c}{b} \times 100\% = 5\%$	

- (2) Management action is required; this £500,000 loss in Contract Values may be interpreted as an indication of inadequate/inefficient marketing.
 - (3) These have been calculated to include Head Office (fixed) costs.
 - (4) The degree of variance analysis should be appropriate to the contract requirement (see Appendix 37 for more details); indicate site inefficiencies or otherwise.
 - (5) These will be detailed, e.g. each element of cost in total (v. Appendix 37 - each element of cost/operation).
- (*) Completed Contracts - see Appendix 28 - for amount(s) to be credited to Profit and Loss Account)

MAIN OPERATING RATIOS

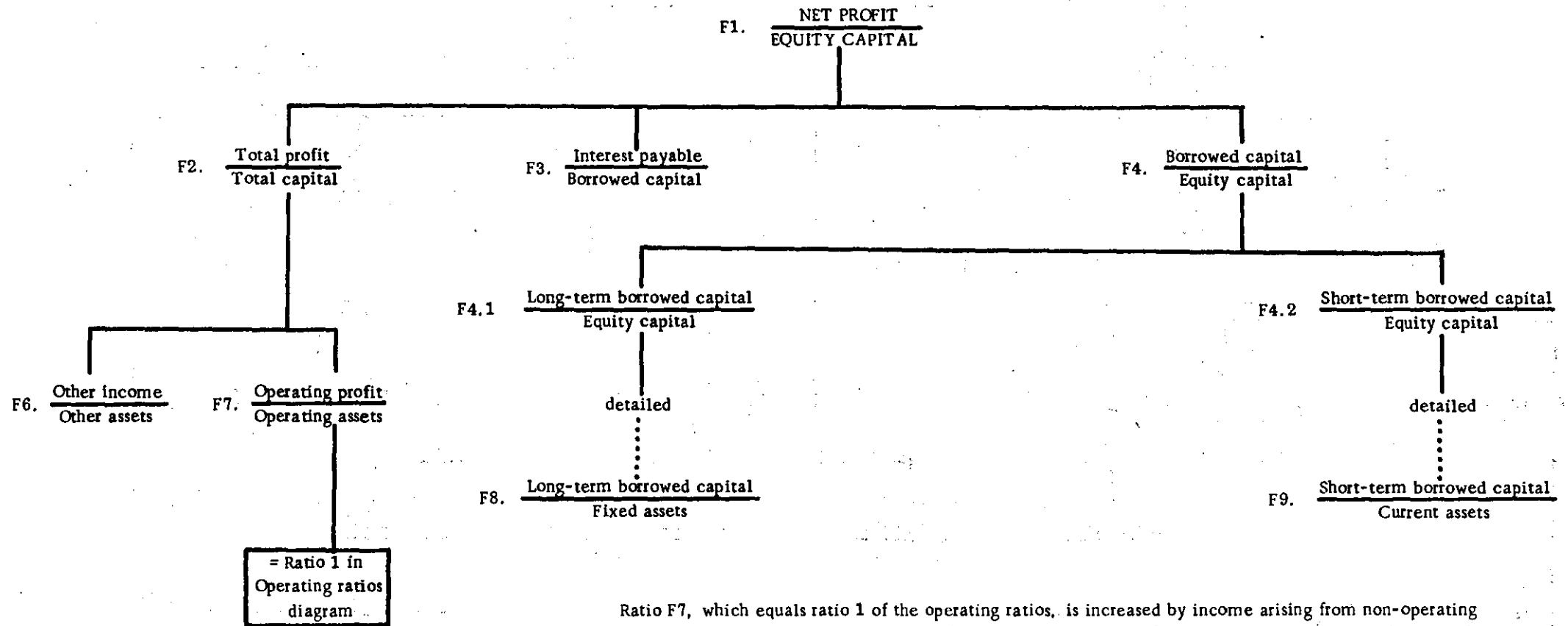
Diagram 1

Note: ratio 1 = ratio 2 x ratio 3
ratio 2 + ratio 4 + ratio 5 + ratio 6 = 100%



Cost ratios expressed as percentages

Asset ratios expressed in £'s per £1,000 of revenue



Ratio F7, which equals ratio 1 of the operating ratios, is increased by income arising from non-operating assets shown by ratio F6, to give the total profit as a percentage of total assets or total capital in ratio F2. Interest payable on all borrowed capital is shown by ratio F3 and is deducted from ratio F2 to give, after adjusting for the effect of gearing in ratio F4, the net profit as a percentage of equity capital in ratio F1. The arithmetic relationship is as follows:-

$$F1 = F2 + [(F2 - F3) \times F4]$$

Ratios F8 and F9 show the cover for each type of borrowed capital. In addition, ratios are also calculated to show interest cover and average periods of credit taken from suppliers and sub-contractors.

APPENDIX 39 and

APPENDIX 40 (Reverse)

Note.

These two pyramids of ratios (as at 1971) represent a refinement of previous published ratios, e.g. in 1969, Diagram 1 consisted of 47 ratios and Diagram 2 consisted of 18 ratios.

ENGLISH UNIVERSITIESMANAGEMENT COURSES

(Examples)

University of Bradford

Financial Control for Executives	-	2 weeks
----------------------------------	---	---------

The City University, London

Planning and Control for the Construction Industry	-	4 weeks
Cost Planning and Control (5 lectures of 1½ hours)	-	7½ hours
Postgraduate Course in Civil Engineering (incorporates Planning, Control and Economics)	-	1 year

University of Technology, Loughborough

Accountancy and Investment Appraisal for Quantity Surveyors	-	2 weeks
Integrated Management for Contractors-		1 week
Education for Construction Manage- ment (For Training Officers)-		1 day
Construction Economics for Quantity Surveyors	-	Not yet decided
Postgraduate Course in Construction (incorporates Finance, Contract Control and Managerial Economics)	-	1 year

ROYAL INSTITUTE OF BRITISH ARCHITECTS

MANAGEMENT COURSES - 1970-71

<u>Name of Course</u>	<u>Duration</u>	<u>Number of Venues</u>
Multi-professional	3 days	8
Resource Allocation and Financial Control	2 days	7
Communications and Data Co-ordination	2 days	4
Project Management (Post Tender)	2 days	8
Administration	1-2 days	7

CONSTRUCTION INDUSTRY TRAINING BOARD

MANAGEMENT COURSES X

<u>Name of Course</u>	<u>Duration</u>	<u>Frequency per year</u>
Financial Management for Building Contractors	3 weeks	10
Capital Structure Module	3 days	10
Capital Budgetary Module	3 days	10
Management Ratios Module	2 days	10
Planning Techniques	3 weeks	10
Work Study Practitioners Course (Basic)	10 weeks	6
Work Study Practitioners Course (Advanced)	5 weeks	6
Training Officers	8 weeks	6
Site Management	3 weeks	10
Contract Management	3 weeks	10
Personnel Management for Builders & Plumbers' Merchants	2 days	3
Marketing & Sales Management for Builders & Plumbers' Merchants	1 week	2

continued

<u>Name of Course</u>	<u>Duration</u>	<u>Frequency per year</u>
<u>For Small Firms</u>		
Management Appreciation	1 week	10
Management Appreciation for Smaller Firms	3 days	10
Planning and Control	3 days	10
Planning and Control for Small Contractors	3 days	10
Basic Estimating	3 days	10
Estimating and Costing	3 days	10
Basic Financial Management	3 days	10
Financial Management Techniques	3 days	10
Office Organisation and Methods	3 days	10

X Out of 30 established Industrial Training Boards, only 4 (including Construction) have set up training centres which provide courses for management or offer a programme of courses.

LOUCHBOROUGH UNIVERSITY

INDUSTRIAL Ph.D.

The candidate undertakes a project determined jointly by the University and a collaborating commercial or industrial organisation which includes:-

(a) experimental and theoretical work, part of which might be carried out at the University; and,

(b) the practical application of this work in the collaborating organisation.

The candidate must also spend some time (in the University) studying subjects outside his field of speciality and studying management aspects (abroad).

(In addition, Staff are encouraged to undertake Ph.D. programmes which involve projects originating from industrial organisations.)

BIBLIOGRAPHY

In the preparation and completion of the thesis, it is acknowledged that reference has been made to and where indicated in the text, quotations extracted from the following list of books, articles, pamphlets, etc.

- | | | |
|------|---|--|
| (1) | American Society of
Civil Engineers | Construction Cost Control
(Committee on Basic Accounting and
Cost Control Procedures - 1951) |
| (2) | Anglo-American Council
on Productivity | Management Accounting Team - Report
on Management Accounting (1951) |
| (3) | - do - | Supervisor Training and Selection
Specialist Team - Training of
Supervisors (1951) |
| (4) | Robert A. Anthony | Management Accounting - Text and Cases
(Richard D. Irwin - 1964) |
| (5) | Chris Argyris | Human Problems With Budgets
(Harvard Business Review - Jan./
Feb. 1953) |
| (6) | W. Atton | Estimating Applied to Building
(Godwin - 1969) |
| (7) | R.G. Bassett | Management Accounting Defined -
(Cost Accountant - 1962) |
| (8) | J. Batty | Corporate Planning and Budgetary
Control (MacDonald Evans - 1970) |
| (9) | - do - | Managerial Standard Costing
(MacDonald Evans - 1970) |
| (10) | R. Beresford Dew | Trends in management until 1985
(Management International - No. 6 -
1962) |

Bibliography

- (11) R. Beresford Dew Managements' Use of Budgetary
 & K.P. Gee Information (Management Accounting
 - March 1970)
- (12) W.W. Bigg & Internal Auditing
 J.O. Davies (H. Foulks - Lynch - 1965)
- (13) P. Bird The Scope of the Company Audit
 (Accounting and Business Research -
 Winter 1970)
- (14) E.B. Bishop Information for Corporate Planning
 (Management Accounting - Aug. 1970)
- (15) British Institute of Efficiency Comparisons within Large
 Management Organisations (B.I.M. - 1962)
- (16) - do - The Making of 'E' Construction Ltd.
 (Management Today - Jan. 1970)
- (17) - do - B.I.M. Annual Report - 1970
- (18) Michael Brownwich Capital Budgeting - a survey
 (Journal of Business Finance -
 Autumn 1970)
- (19) Brunton, Baden Management Applied to Architectural
 Hellard & Boobyer Practice (Godwin - 1964)
- (20) C.E. Bullinger Engineering Economy
 (McGraw Hill - 1958)
- (21) J. Bullock & Capital Investment Appraisal
 P.F. Jones (British Productivity Council - 1969)
- (22) P. Burger Management by Objectives
 (British Productivity Council - 1969)
- (23) C.I. Buyers & Principles of Cost Accountancy
 G.A. Holmes (Donnington & Cassell - 1961)
- (24) R.E. Calvert Introduction to Building Management
 (Newnes-Butterworth - 1970)
- (25) G.H. Carr Operational Bills in Practice
 (The Chartered Surveyor - April 1965)

Bibliography

- (26) Bryan V. Carsberg An Introduction to Mathematical
 Programming for Accountants
 (Geo. Allen & Unwin Ltd. 1969)
- (27) C.E.G.B. Measuring the Spend Rate: Budgetary
 Control of Contracts for Power
 Station Construction (C.E.G.B. -
 June 1969)
- (28) Centre for Interfirm Management Ratios & Interfirm
 Comparison
 Comparison for Management
 (D.I.M. pamphlet - 1969)
- (29) W.W.L. Chan Programming Techniques for the Client,
 the Designer and the Builder
 (Structural Engineer - Vol.46 - 1968)
- (30) N.C. Churchill & Management Accounting Tomorrow -
 M. Uretsky (Management Accounting (U.S.A.) -
 June 1969)
- (31) C.W. Churchman, Introduction to Operations Research
 R.L. Ackoff & (John Wiley & Son, London - 1957)
 E.L. Arnott
- (32) P.L. Clood Management Information - A Systematic
 Approach (Administrative Staff
 College - 1968)
- (33) Confederation of Industry, Science & Universities
 British Industries (C.B.I. - July 1970)
- (34) W.B. Coombs Construction Accounting and Financial
 Management (McGraw Hill - 1958)
- (35) F.E. Dalton & The Role of Accountant Training in
 John B. Miner Top Management Decision Making
 (Accounting Review - January 1970)
- (36) G. Deatherage Construction Estimating and Job Pre-
 Planning (McGraw Hill - 1965)
- (37) R. Warwick Dobson Distribution Cost Accounting
 (Gee & Co. (Publishers) Ltd. - 1969)

Bibliography

- (38) Dr. Gerhard Dressel Organisation and Management of a
Construction Company (MacLaren
& Sons, London - 1968)
- (39) P. Drucker What Communication Means
(Management Today - B.I.M. -
March 1970)
- (40) Dun & Bradstreet Key Business Ratios for the Building
Construction Contractor
(Dun & Bradstreet - 1964)
- (41) - do - The Failure Record Through 1965
(Dun & Bradstreet - 1966)
- (42) D.W. Fwing Long-Range Planning for Management
(Harper & Row, New York - 1964)
- (43) A.I.G. Farquharson Reporting for Profit
(Cost Accountant - Aug. 1962)
- (44) N. Farrow Progress of Management Research
(Pelican Books - 1969)
- (45) R.A. Fawthrop Integrated Financing Decisions for
Capital Expenditure Control
(University of Lancaster - 1970)
- (46) D.J. Ferry Cost Planning for Buildings
(Lockwood - 1964)
- (47) H.L. Gantt Compensation of Workmen & efficiency
of Operation (Engineering Magazine -
1910)
- (48) J. Gibson Management by Objectives
(Management Accounting - May 1970)
- (49) P. Gill Systems Management Techniques for
Builders & Contractors
(McGraw-Hill - 1968)
- (50) J.B. Goodlad An Appraisal of Management Accounting
(The Commercial Accountant - July 1964)

Bibliography

- (51) J.B. Goodlad Management Accounting and Industrial Management (Management Accounting - January 1965)
- (52) - do - The Education and Training of the Management Accountant (Derby & District College of Technology - Research Paper - 1967)
- (53) - do - Financial Control in Industry (Unpublished Research Paper - 1968)
- (54) H. Hess Manufacturing: Capital, Costs, Profits and Dividends (Engineering Magazine - 1903/4)
- (55) - do - Manufacturing Profits and Losses (Engineering Magazine - 1910)
- (56) G.H. Hofstede A Game of Budget Control (Tavistock Publications - 1968)
- (57) Charles T. Horngren Accounting for Management Control - An Introduction (Prentice - Hall - 1965)
- (58) - do - Cost Accounting - A Managerial Emphasis (Prentice - Hall - 1962)
- (59) J. Humble Improving Management Performance - a dynamic approach to management by objectives (Management Publications Ltd. - 1969)
- (60) G.J.J. Hunt The Co-ordination of Pricing Structure with Costing and Margins (C.I.T.B. Project Finance Course - 1969)
- (61) Y. Ijiri & R.K. Jaedicke Mathematics and Accounting (The Singapore Accountant - Vol.4 - 1969)
- (62) H. Ingham Self-Diagnosis by Inter-firm Comparison (D.P.C. - Target - June 1967)

Bibliography

- | | | |
|------|--|--|
| (63) | Institute of Cost and
Works Accountants | Terminology of Cost Accountancy
(Gee & Co. Ltd. - 1967) |
| (64) | - do - | Introduction to Business Forecasting
(Gee & Co. Ltd. - 1968) |
| (65) | - do - | An Introduction to Budgetary Control,
Standard Costing, Material Control
and Production Control (Gee & Co.
Ltd. - 1950) |
| (66) | - do - | A Report on Marginal Costing
(Gee & Co. Ltd. - 1962) |
| (67) | - do - | The Profitable Use of Capital in
Industry (Gee & Co. Ltd. - 1965) |
| (68) | - do - | Management By Objectives
(Management Accounting - July 1969) |
| (69) | - do - | Presentation of Information to
Management (I.C.W.A. - 1955) |
| (70) | Institute of Quantity
Surveyors | The Quantity Surveyor: a survey of
the profession (The Institute -
1970) |
| (71) | - do - | Operational Bills: a critical
appreciation (The Institute - 1970) |
| (72) | International Tutor
Machines Ltd. | Introduction to Management Statistics
(English Universities Press Ltd. -
1965) |
| (73) | Eric L. Kohler | Background for Management Accounting
Techniques (N.A.A. Bulletin -
October 1961) |
| (74) | J.P. Lewis | Building Cycles and Britain's Growth
(MacMillan - 1965) |
| (75) | K.G. Lockyer | An Introduction to Critical Path
Analysis (Sir Isaac Pitman & Sons -
1967) |

Bibliography

- (76) R.M. Lynch Accounting for Management - Planning
and Control (McGraw-Hill - 1967)
- (77) Rex Palik What's Wrong with British Industry
(Penguin Books - 1964)
- (78) D.A.J. Manser What the Accountant Can Provide for
Top Management (The Cost Accountant -
December 1960)
- (79) R.K. Pautz &
Jack Gray Some Thoughts on Research Needs in
Accounting (Journal of Accountancy -
September 1970)
- (80) A.J. Merrett &
Allen Sykes Capital Budgeting & Company Finance
(Longmans, Green & Co. - 1966)
- (81) D. Miller The Meaningful Interpretation of
Financial Statements (American
Management Association - 1966)
- (82) L.C. Miller Successful Management for Contractors
(McGraw-Hill - 1962)
- (83) Ministry of Public
Buildings & Works The Placing and Management of Contracts
for Building and Civil Engineering
Work (The Barwell Report - H.M.S.O. -
1964)
- (84) - do - Survey of Problems before the
Construction Industries (H.M.S.O. -
1962)
- (85) - do - Winter Building Costs
(Research & Development - 1967)
- (86) - do - Directory of Construction Statistics
(Research & Development - H.M.S.O. -
1968)
- (87) - do - Tendering Documents with a Production
Bias. (Building Research Station -
Digest 97 - 1968)

Bibliography

- (88) Ministry of Public Buildings & Works Annual Bulletin of Construction Statistics (Construction Economics Division - 1968)
- (89) - do - Coding and Data Co-ordination - a Short Report (Research & Development - H.M.S.O. - 1969)
- (90) - do - Operational Bill Comes Into its Own (Building Research Station - BRS News - Summer 1970)
- (91) - do - Collection of Construction Statistics (Building Research Station - 1968)
- (92) - do - The Building Process - A Case Study from Marks & Spencer Ltd. (Research & Development - H.M.S.O. - 1970)
- (93) - do - Introducing Bills of Quantities - Operational Format (Building Research Station - 1968)
- (94) K.S. Most Uniform Cost Accounting (Gee & Co. - 1961)
- (95) Operational Research Society & Institute of Cost and Works Accountants Project Cost Control Using Networks (Gee & Co. Ltd. - 1969)
- (96) A.R. Orenfeldt Executive Action in Marketing (Wadsworth - New York - 1966)
- (97) R. Oxley & J. Poskitt Management Techniques Applied to the Construction Industry (Crosby Lockwood - 1968)
- (98) W.R. Park Strategy of Contracting for Profit in the Construction Industry (Prentice - Hall - 1968)
- (99) R.H. Parker Management Accounting: an Historical Perspective (MacMillan - 1969)

Bibliography

- (100) B.B. Parkinson Accounting Ratios in Theory and Practice (Gee & Co. (Publishers) Ltd. - 1951)
- (101) Political & Economic Planning Ltd. Thrusters & Sleepers - A Report of Attitudes in British Management (Pelican - 1965)
- (102) R. Pilcher Principles of Construction Management (McGraw-Hill - 1966)
- (103) - do - Budgetary and Cost Control for Civil Engineering Construction Allied to Modern Methods of Programming (M.Sc. Thesis - Loughborough University of Technology - 1966)
- (104) H.E. Pulver Construction Estimates and Costs (McGraw-Hill - 1960)
- (105) A.M.A. Rahim Industrial Managers' Acceptance and Use of Budgetary Control Techniques - an Empirical Approach (University of Manchester 1966; research with Professor R. Beresford Dew)
- (106) H. Ross Financial Statements - A Crusade for Current Values (Pitman - Canada - Ltd. - 1969)
- (107) Royal Institute of British Architects Management Accounting for the Architect (R.I.B.A. - 1968)
- (108) J.A. Scott Budgetary Control and Standard Costs (Pitmans - 1970)
- (109) Ivor H. Seeley Civil Engineering Quantities (MacMillan & Co. Ltd. - 1965)
- (110) - do - Civil Engineering Specification (MacMillan & Co. Ltd. - 1968)
- (111) K. Simmonds & R. Vause Cost Estimating under Uncertainty (Accountancy & Business Research - Winter 1970)

Bibliography

- | | | |
|-------|---------------------------------|---|
| (112) | J. Sizer | An Insight into Management Accounting
(Pelican Library of Business &
Management - 1969) |
| (113) | H.C. Thuesen &
W.J. Fabrychy | Engineering Economy
(Prentice - Hall - 1964) |
| (114) | S.A. Tucker | Successful Managerial Control by
Ratio Analysis (McGraw-Hill - 1961) |
| (115) | J.H.W. Turner | Construction Management for Civil
Engineers (C.R. Books Ltd. - 1963) |
| (116) | B.C. Vickery | Principles and Practice of Book-keeping
& Accounts (Cassell & Donnington -
1968) |
| (117) | C.J. Walker | Principles of Cost Accountancy
(MacDonald & Evans - 1970) |
| (118) | R.W. Wallis | Accounting - A Modern Approach
(McGraw-Hill, London - 1970) |
| (119) | D.E. Warland | Building Administration
(University of London Press - 1962) |
| (120) | R.M.S. Wilson | Accounting Approaches to Marketing
Control (Management Accounting -
February 1970) |
| (121) | - do - | Perspectives in Accounting for Control
(Management Accounting - August 1970) |
| (122) | H.W. Wolkstein | Accounting Methods and Controls for
the Construction Industry
(Prentice - Hall - 1967 - Reprint 1969) |
| (123) | M.G. Wright | Discounted Cash Flow
(McGraw-Hill - 1967) |

