1 Introduction and Background 1

Construction viewed from space 2

What is construction? 9

Why a theory of construction management is needed 11

Who can manage construction? 12

Construction managed by designers 13

Construction managed by customers 15

Construction managed by contractors 16

Construction managed by facilities managers 17

Construction managed by independent project managers 18

Construction managed by independent construction managers 20

How the construction industry works 21

Designer-led practice 22

Manager-led practice 23

Contractor-led practice 25

Conclusions 28

2 The Built Environment 31

Introduction 31

Forces which shape the built environment 34

Climate and geology 35

Economy 35

Government 36

Culture and fashion 37

Technology 39

Customers 40

Buildings and infrastructure 48

Architecture 49

Civil engineering 49

Thinking about the forces which shape the built environment 50

3 Construction Concepts 53

Introduction 53

Construction products 53

Customers 53

Construction actions 54

Construction 59

Construction organizations 60

Common characteristics of construction organizations 62

Interactions and relationships 64

Double-loop learning in construction networks 66

Categories of relationship 67

Factors influencing construction performance 69

Construction management 71

Construction efficiency 71

4 Theory of Construction Management 75

Introduction 75

A worst case construction project 77

A straightforward and certain construction project 80

Barriers to effective relationships 82

Inherent difficulty caused by design 83

Inherent difficulty caused by construction teams 84

Inherent difficulty caused by construction environments 85

Inherent difficulty 85

Construction management 86

Construction management strategies 86

Basic theorems 87

Basic propositions about construction management decisions 88

Construction teams efficiency conditions 89

Propositions about construction management decisions relating to construction teams 90

Construction team relationships efficiency conditions 90

Propositions about construction management decisions relating to construction team relationships 91

Construction companies' efficiency conditions 91

Propositions about construction management decisions relating to construction companies 92 Common organizational characteristics efficiency conditions 92

Propositions about construction management decisions relating to common characteristics of construction organizations 93

Double-loop learning condition 94

Propositions about construction management decisions relating to double-loop learning 94

Construction efficiency 95

Inherent difficulty indicators 95

IDIs in Practice 102

Size of construction projects 106

Using the theory of construction management 107

5 Traditional Construction 111

Introduction 111

Fundamental traditional construction 111

Project organization 112

Strengths and weaknesses 112

Construction management propositions and fundamental traditional construction 114

New technologies 114

Demanding customers 116

Developed traditional construction 117

Internal and boundary relationships 118

Strengths of developed traditional construction 120

Weaknesses of developed traditional construction 120

Construction management propositions and developed traditional construction 122

Scenarios to rescue developed traditional construction 127

Projects led by design consultants 127

Specialist contractor design 130

Architects and engineers design 132

Conclusions 133

6 Design Build 137

Introduction 137

Design build customers 138

Design build companies 140

Design build process 143

Design build performance 145

Design build efficiency 148

Construction management propositions 149

The theory of construction management 150

7 Management Approaches 157

Introduction 157

Customers 159

Designers 159

Construction managers 161

Works contractors 162

Construction management process 162

Construction management propositions 165

Construction management performance 166

Other management approaches 169

The theory of construction management 170

8 Partnering 177

Introduction 177

Project partnering 178

Strategic partnering 182

Strategic collaborative working 189

Partnering efficiency 191

Construction management propositions 193

Partnering performance 194

The theory of construction management 195

9 Total Construction Service 201

Introduction 201

Total construction service providers 201

Industrialised housing 203

General construction 206

Other total construction service companies 212

Total construction service efficiency 215

Construction management propositions 220

Total construction service performance 221

The theory of construction management 222

10 Implications for Industry 229

Introduction 229

Implications for customers 229

Implications for construction companies 239

Construction company strategies 241

Implications for construction companies providing a total construction service 241

Implications for project management companies 248

Implications for construction management companies 248

Implications for design companies 252

Implications for specialist contractors 253

Implications for other construction companies 255

11 The Future for Construction Management 257

Introduction 257

The theory of construction management and practice 259

The theory of construction management and research 262

Testing the theory of construction management 267

Research data 267

Research proposals 268

A basis for future practice and research 275

Appendix: Theory of Construction Management Propositions 277

Glossary 279

Index 283