

Contents

<i>About the Authors</i>	x
<i>Preface</i>	xi
1 Organising Construction Processes in Construction Companies	1
1.1 Educational outcomes	1
1.2 The facility life-cycle	1
1.3 Production by projects	4
1.4 The construction industry	6
1.5 Construction companies	9
1.6 Organisational structure of a construction company	13
1.7 The construction site within the construction company	17
References	18
Further reading	19
2 Contract Documents	20
2.1 Educational outcomes	20
2.2 Contract documents	20
2.3 Type of documents	23
2.4 Bidding documents	26
2.5 Contractor tender or bid	29
2.6 Estimating process	29
2.7 Contract agreement	33
2.8 Bill of quantities	35
2.9 General and particular conditions	37
2.10 Technical specifications	41
2.11 Contract drawings	43
2.12 Other documents	46
References	48
Further reading	49
3 Procurement Approaches	50
3.1 Educational outcomes	50
3.2 Introduction to procurement	50
3.3 Traditional procurement	53
3.4 Design-build arrangements	55
3.5 Management contracting	56
3.6 Construction management	58
3.7 Relational contracting	59
3.8 Public concessions and public-private partnerships	62

3.9	Organisation modelling	65
3.10	The project manager team	66
	References	67
	Further reading	68
4	Communications, Information and Documentation	69
4.1	Educational outcomes	69
4.2	Importance of communications, documentation and information	69
4.3	Communications on site	71
4.4	Daily logs	74
4.5	Reports	74
4.6	Construction diary	78
4.7	Meetings	79
4.8	Photographs and videos on site	80
4.9	Information and documentation flow in construction	81
4.10	Information and communications technologies (ICT)	82
4.11	Building information modelling (BIM)	87
4.12	Electronic business and project administration	89
	References	93
	Further reading	94
5	Site Setup and Construction Processes	95
5.1	Educational outcomes	95
5.2	Site constraints	95
5.3	Equipment constraints	98
5.4	Material storage and handling	99
5.5	Temporary facilities and auxiliary works	100
5.6	Construction jobsite offices	101
5.7	Security on construction sites	103
5.8	Internal organisation of the construction works	105
5.9	General approach to construction processes	108
5.10	Temporary works	110
	References	112
	Further reading	113
6	Machinery and Equipment	114
6.1	Educational outcomes	114
6.2	The need of machinery and equipment	114
6.3	Selection of machinery and equipment	115
6.3.1	Conditioning factors	115
6.3.2	Methods used to select the machine in relation to economic profitability	116
6.4	Calculation of costs	118
6.4.1	Fixed and variable hourly costs	118
6.4.2	Equipment ownership costs	119
6.4.3	Operating costs	124

6.5	Maintenance	127
	References	129
	Further reading	130
7	Productivity and Performance	131
7.1	Educational outcomes	131
7.2	Productivity and performance	131
7.3	Work study	134
7.4	Method study	135
7.5	Work measurement	136
7.6	Equipment performance	141
7.7	Assessment of production/productivity	144
7.8	Benchmarking and construction productivity improvement	145
	References	149
	Further reading	150
8	Quality, Innovation and Knowledge Management	151
8.1	Educational outcomes	151
8.2	Quality, innovation and knowledge	151
8.3	Quality control	153
8.4	Quality assurance in accordance with ISO 9001	154
8.5	Innovation in construction projects	156
8.6	Knowledge management in construction	162
8.7	Standards and procedures	164
8.8	Certificates and technical approvals	165
	References	167
	Further reading	168
9	Health and Safety Management	169
9.1	Educational outcomes	169
9.2	Introduction to occupational health and safety	169
9.3	The risk–accident cycle	170
9.4	Regulatory context	171
9.5	Agents involved	173
9.6	Business context	174
9.7	On-site prevention	174
9.8	Health and safety plan	177
9.9	Management of the health and safety plan	178
9.10	Incidents and accidents during construction	184
	References	186
	Further reading	187
10	Environmental and Sustainability Management	188
10.1	Educational outcomes	188
10.2	Environmental impact assessment	188
10.3	Basic legislation for environmental impact assessment	190

10.4	Environmental management tools	191
10.5	Environmental management at the construction site	192
10.6	Construction and demolition (C&D) waste management	193
10.7	C&D reduction, reuse and recycling	196
10.8	Environmental monitoring plan	198
10.9	Environmental impacts at the construction site	199
10.10	Sustainability in construction	200
10.11	Green buildings and certifications	201
	References	203
	Further reading	204
11	Supply Chain Management	205
11.1	Educational outcomes	205
11.2	Introduction to supply chain management	205
11.3	The construction supply chain	207
11.4	Pros and cons of subcontracting in the construction industry	209
11.5	Procurement and management of subcontracts	211
11.6	Purchase of materials and equipment	213
11.7	Coordination of suppliers and subcontractors	215
11.8	Lean construction	216
	References	219
	Further reading	220
12	Resources Management	221
12.1	Educational outcomes	221
12.2	Construction planning	221
12.3	Work breakdown structure	224
12.4	Scheduling of activities	226
12.5	Duration of activities	227
12.6	Resources limitations and leveling	229
12.7	Bar chart or Gantt diagram	230
12.8	Network diagrams	232
	12.8.1 Historical introduction	232
	12.8.2 Graphical representation	233
	12.8.3 Calculating the critical path	234
	12.8.4 Probability applications	236
	12.8.5 The precedence diagramming method	237
	12.8.6 Critical chain	239
	12.8.7 Commercial software	240
12.9	Line of balance	241
12.10	Last planner system	242
12.11	Time control	246
12.12	Cost assessment and control	247
12.13	Earned value management	250
12.14	Value engineering	252

12.15	Risk management	254
	References	258
	Further reading	260
13	Progress Payment	261
13.1	Educational outcomes	261
13.2	Introduction to progress payment	261
13.3	Lump sum contract	263
13.4	Unit price contract	264
13.5	Cost plus contract	267
13.6	Incentive contract	268
13.7	Percentage of construction fee contract	269
13.8	Progress payment procedures	269
	References	272
	Further reading	273
14	Claims and Change Management	274
14.1	Educational outcomes	274
14.2	Introduction to claims and change management	274
14.3	Definition of claim	275
14.4	Causes of claims	277
14.5	Types of claims	280
14.6	Claim management process	281
14.7	Claim avoidance practices	287
14.8	Management of the change process	288
	References	291
	Further reading	292
15	Project Closeout	293
15.1	Educational outcomes	293
15.2	The closeout process	293
15.3	Completion and closing of the construction project	294
15.4	Inspection and tests	297
15.5	Handover	299
15.6	Occupation	300
15.7	Final documentation	301
15.8	Post-project review	303
	References	307
	Further reading	307
	<i>Index</i>	309