

Contents

Chapter 1: Introduction	1
1.1 Some Typical Examples for Hierarchical Situations	7
1.2 Examples of Hierarchical Structures	12
1.3 Some Important Properties of Hierarchical Systems ..	18
1.4 Overview of the Treatise	20
PART I: Basic Concepts	25
Chapter 2: Basic Concepts of Hierarchical Planning .	27
2.1 General Characterization of Hierarchical Planning Structures	28
2.2 Coupling Equations and Anticipation Function	34
2.3 Distinguishing Hierarchical Configurations by their Team Character	40
2.4 Classifying General Planning Hierarchies by their Anticipation	42
2.5 Three Illustrative Examples	46
2.5.1 Example 1: Make or Buy Decisions	46
2.5.2 Example 2: A Working Time Planning Model	54
2.5.3 Example 3: Supply Contracts	59
2.6 Some General Observations Concerning the Solution of the Coupling Equations	67

Chapter 3: Constructional Hierarchies	71
3.1 Decomposition Hierarchies	73
3.1.1 A Capacity Adaptation Model	74
3.1.2 A Coordination Hierarchy of the Dantzig/ Wolfe-Type	80
3.2 Relaxation Hierarchies	85
Chapter 4: Organizational Hierarchies	91
4.1 Top-Down Hierarchies	92
4.1.1 A Hierarchical Planning Model for the Repair Shops of the Deutsche Lufthansa AG	93
4.2 Tactical-Operational Hierarchies	99
4.2.1 Capacity Adaptation Hierarchy	101
4.2.2 Investment-Production Hierarchies	103
4.2.3 Two-Stage Linear Programming	106
4.2.4 Strategic-Tactical-Operational Hierarchy	109
Chapter 5: Principal Agent Hierarchies	117
5.1 Information Situation in the Principal Agent Theory	118
5.2 The Standard Problem of Principal Agent Theory	121
5.3 An Illustrative Example with Risk-Neutral Antagonists	125
5.3.1 Problem Statement and Problem Formulation	125
5.3.2 Problem Solution	127
5.4 Some General Observations Concerning the Solution of the Principal Agent Coupling Equations	130
5.5 The LEN-Model	133

PART II: General Applications	141
Chapter 6: Hierarchical Production Planning	143
6.1 Standard Model of Hierarchical Production Planning	144
6.1.1 The Structure of the Model	145
6.1.2 Mathematical Formulation of the Decision Models for the Three Levels	147
6.1.3 General Discussion of Hierarchical Production Planning	152
6.2 Integrative Hierarchical Production Planning	155
6.2.1 A Model to Illustrate the Integrative Approach to HPP	156
6.2.2 Interpretation of the Integrative Model in Terms of a Tactical-Operational Hierarchy	164
6.2.3 General Discussion of the Integrative HPP	166
6.3 Process Production	168
6.3.1 A Dynamic Programming Formulation for Medium and Short Term Process Production	170
6.3.2 Integrative Hierarchical Production Planning	177
6.3.3 General Discussion	189
Chapter 7: Organizational Design and Flexibility	193
7.1 Designing a Hierarchy	194
7.2 The Design of a Flexibility Potential	198
7.2.1 Some Preliminary Remarks	198
7.2.2 Elementary Components of a Flexibility Measure	199
7.2.3 A General Measure of Flexibility	202
7.2.4 Numerical Specification of Flexibility	203
7.2.5 Planning and Implementation Ability as Further Components of Flexibility	205
7.2.6 The Design of Flexibility as a Hierarchical Planning Problem	207

Chapter 8: Implementation	211
8.1 Planning and Implementation as a Two-Stage Hierarchy	213
8.2 Implementation as a Three-Stage Hierarchy	216
8.2.1 A General Model	216
8.2.2 The Solution Hierarchy	218
8.3 Formal Description of the Planning and Implementation Problem	219
8.3.1 The Coupling Equations of Hierarchical Planning	219
8.4 Working Time Contract	221
8.5 Implementation of Lotsizes	225
8.5.1 The Planning Level: Determination of Target Lotsizes	227
8.5.2 The Implementation Level: Adaptation of Target Lots	229
8.5.3 Anticipation	231
8.5.4 Description within the Framework of Hierarchical Planning	232
Chapter 9: Cost Accounting	235
9.1 General Considerations	238
9.2 Steering Costs	241
9.3 Tactical-Operational Cost Evaluation	243
9.3.1 Investment-Oriented Cost Evaluation	244
9.4 Strategic Costs	250
9.5 Incentive and Transformational Costs	252
PART III: Leadership	255
Chapter 10: Hierarchical Configurations	257
10.1 The Individual Decision Process	260
10.1.1 General Two-Step Structure	260
10.1.2 A More Refined Description	262

10.1.3 The Entire Decision Process	267
10.2 A Formal Description of Hierarchical Configurations	270
10.2.1 The Interaction of Individual Decision Processes	270
10.2.2 The General Coupling Equations	273
10.2.3 Leadership Properties of the Coupling Equations	279
Chapter 11: Coordination	283
11.1 General Features of a Coordination Process	285
11.2 A Linear Coordination Process	287
11.3 Hierarchical Interference in the Base-Level Decision Processes	290
11.4 The Entire Coordination Process	293
Chapter 12: Negotiations	297
12.1 A Hierarchical Negotiation Situation	299
12.2 A Formal Description of the Negotiation	302
12.3 Negotiations in the Presence of Multiple Scenarios	304
12.4 The Strategic Decision	308
12.5 The Entire Negotiation Process	309
Chapter 13: A Unifying Perspective of the Management Process	313
13.1 Summarizing Key Notions of the Developed Theory	315
13.2 The Impact of Hierarchies in Distributed Decision Making on Specific Theories in Business Administration	318
13.3 The Management Process	321
Bibliography	325
Index	339