INTERACTIVE MULTIPLE GOAL PROGRAMMING FOR
CAPITAL BUDGETING AND FINANCIAL PLANNING

CONTENTS

List of Tables X
List of Figures XI
1. Introduction 1
1.1. Motivation 1
1.2. Scope of the Study 4
1.3. Outline of the Contents 6
References 9

2. Multiple Goals in Capital Budgeting and Financial Planning 10
2.1. Introduction 10
2.2. Constraints in Capital Budgeting and Financial Planning 13
2.3. The Goal of Market Value Maximization 16
2.4. Assumptions with Respect to the Decision Maker and the Organization 20
2.5. The Firm's Market Value as One of the Elements in a Dynamic Goal Complex 25
References 28

3. A Survey of Multiple Criteria Decision Methods 30
3.1. Terminology and Basis Concepts 30
3.2. Decision Problems and Methods 35
3.3. Some Characteristics of Decision Problems 39
3.4. A General Overview of Available Methods 43
3.5. An Overview of Multiple Objective Programming Methods 50
3.6. Conclusion 54
References 55

VII
LIST OF TABLES

4.1. The effect of different functionals $\alpha^+ y^+ + \alpha^- y^-$ being minimized 67
4.2. Example of possible trade-offs between profit and sales 74
4.3. The initial standard simplex tableau 87
4.4. The initial adapted simplex tableau 89
7.1. Successive (proposal) solutions together with the opinion of the decision maker 161
7.2. IMPG applied to Lee's model 171
7.3. A session with a decision maker investigating the goal conflicts within an economic-environmental system 174
7.4. Alternative types of washing machines 177
7.5. Profiles of the location alternatives 182
9.1. Unlevered present values and net cash flows of the projects 227
9.2. Earnings contributed by the projects 228
9.3. Projects effects on the firm's total employment 229
9.4. Investment projects chosen when different goal variables are optimized, first iteration 237
9.5. Some outcomes when different goal variables are optimized, first iteration 238
9.6. Potential goal values during the interactive process 239
9.7. Some outcomes when the market value is maximized, final iteration 241
9.8. Potential goal values during the interactive process, integer case 243
9.9. Some outcomes when the market value is maximized, final iteration, integer case 245
**LIST OF FIGURES**

3.1. A set of alternative actions in the instrument value space and the associated goal vectors in the goal value space 32

3.2. A typical decision situation 36

3.3. Some sets of characteristics of decision problems 40

4.1. A goal variable being a piecewise linear function of one instrumental variable 69

4.2. Example of a dispreference function which is not convex in x 73

4.3. The effects of a negative shift of the aspiration level \( b_i \) on the deviational variables \( y_i^+ \) and \( y_i^- \) 95

5.1. The interactive approach 103

5.2. Classification of interactive multiple objective programming methods 124

6.1. The preference function \( f \) as a function of one goal variable only 132

6.2. The relationship between solutions in the goal value space and in the instrument value space 135

6.3. A flow chart of the extended interactive multiple goal programming procedure 142

7.1. A production planning problem 159

7.2. All solutions from the starting solution up to and including the final solution 160

7.3. The time budget allocation problem 163

7.4. Successive IMGP steps for the time budget allocation problem 164

7a.1. Structure of the computer program 188

7a.2. Flow chart of the subprogram used for the experiments with an imaginary decision maker 189
7b.1. The system of computer programs used for the implementation of IMGP 191
8.1. The set of feasible (0,1) solutions represented in goal value space 212