Dinesh Gupta

Strategic allocation of resources using linear programming model with parametric analysis

in MATLAB and Excel Solver

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ABSTRACT

Since the late 1940s, linear programming models have been used for many different purposes. Airline companies apply these models to optimize their use of planes and staff. NASA has been using them for many years to optimize their use of limited resources. Oil companies use them to optimize their refinery operations. Small and medium-sized businesses use linear programming to solve a huge variety of problems, often involving resource allocation.

In my study, a typical product-mix problem in a manufacturing system producing two products (each product consists of two sub-assemblies) is solved for its optimal solution through the use of the latest versions of MATLAB having the command *simlp,* which is very much like *linprog.* As analysts, we try to find a good enough solution for the decision maker to make a final decision. Our attempt is to give the mathematical description of the product-mix optimization problem and bring the problem into a form ready to call MATLAB's *simlp* command. The objective of this paper is to find the best product mix that maximizes profit. The graph obtained using MATLAB commands, give the shaded area enclosed by the constraints called the feasible region, which is the set of points satisfying all the constraints. To find the optimal solution we look at the lines of equal profit to find the corner of the feasible region which yield the highest profit. This corner can be found out at the farthest line of equal profit which still touches the feasible region.

The most critical part is the sensitivity analysis using Excel Solver and Parametric Analysis using computer software which allows us to study the effect on optimal solution due to discrete and continuous change in parameters of the LP model including to identify bottlenecks. We have examined other options like product outsourcing, one-time cost, cross training of one operator, manufacturing of hypothetical third product on under-utilized machines and optimal sequencing of jobs on machines.

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Flt Lt Dinesh Kumar Gupta

Dedicated

to

My Mother and Father

who let me make my own decisions and showed me how to live with integrity.

TABLE OF CONTENTS

ABSTRACT
ACKNOWLEDGEMENTS
TABLE OF CONTENTS i
LIST OF FIGURES iv
LIST OF TABLES v
LIST OF ABBREVIATIONS vi

CHAPTER 1
INTRODUCTION
1.1 HISTORY 1
1.2 PRINCIPLES OF MATHEMATICAL PROGRAMMING 1
1.3 LINEAR PROGRAMMING 2
1.3.1 Limitations of LP model 3
1.4 MOTIVATION 3
1.4.1 Examples of successful LP applications. 4
1.5 CHARACTERSTICS OF LINEAR PROGRAMMING 5
1.6 SOLVING LP PROBLEMS 7
1.7 BASIC STEPS FOR SOLVING A LP MODEL 7
1.7.1 Recognize the problem 8
1.7.2 Define the problem 9
1.7.3 Define the decision variables 9
1.7.4 Collect the necessary parametric data 9
1.7.5 Formulate a model 10
1.7.6 Solve the model 10
1.7.7 Verify and validate the model 10
1.7.8 Analyze model output 11
1.7.9 Interpret model results 11
1.7.10 Recommend a course of action 11
1.8 FORMULATING LP PROBLEMS 11
1.9 OBJECTIVES OF THE STUDY 12
1.10 ORGANISATION OF THE STUDY 12
1.11 SUMMARY 12

CHAPTER 2
LITERATURE REVIEW
2.1 INTRODUCTION 13
2.2 DECISION MAKING IN POM 13
2.3 THE SIMPLEX METHOD 15
2.4 THE COMMAND linprog 15

2.5 USING EXCEL SOLVER OPTIMIZATION PROBLEM 16
2.5.1 Spreadsheet modeling & Excel Solver 17
2.6 PRODUCTION OUTSOURCING: A LP MODEL FOR THE TOC 17
2.7 GENERAL RESOURCE ALLOCATION MODEL 18
2.8 SUMMARY 19

CHAPTER 3
LINEAR PROGRAMMING MODEL
3.1 INTRODUCTION 20
3.2 THE PROBLEM STATEMENT 21
3.3 FORMULATION OF LP MODEL 23
3.4 SOLUTION USING MATLAB 24
3.5 THE COMMAND simlp 25
3.6 THE OPTIMAL SOLUTION USING MATLAB 27
3.7 SOLUTION USING EXCEL SOLVER 27
3.8 OPTIMAL SCHEDULING ON MACHINES 29
3.8.1 Assumptions in sequencing problem 29
3.8.2 Processing two jobs through four machines 29
3.9 SUMMARY 33

CHAPTER 4
INTERPRETING COMPUTER SOLUTIONS OF LP PROBLEM
4.1 INTRODUCTION 34
4.2 TERMS 34
4.2.1 Slack variables 36
4.2.2 Basic & non-basic variables 36
4.3 ANSWER REPORT ANALYSIS 37
4.4 SENSITIVITY ANALYSIS 38
4.4.1 Find the bottleneck 38
4.4.2 Find the range over which the unit profit may change 39
4.4.3 Find the marginal benefit of increasing the time availability 39
4.4.4 Find the range over which the time availability may change 41
4.5 PARAMETRIC ANALYSIS 41
4.5.1 Variation in resource availability (Right hand side value) 42
4.5.2 Variation in resource consumed (coefficient of constraint) per unit of P product 43
4.5.3 Variation in resource consumed (coefficient of constraint) per unit of Q product 45
4.6 SUMMARY 46