

Application of Linear Programming for Profit Maximization of Gurgaon Central (Shoe Industry)

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ABSTRACT:

The main objective of this study is to examine the application of linear programming in profit maximization of a shoe industry. In this study, linear programming model was used to allocate raw materials (resources) to the production Company's products so as to know the right product mix that actually maximizes the Company's profit and in what capacities. Data collected on these known products were analysed using simplex algorithm of linear programming with the help of Tora Software. To encourage companies to adopt the application of linear programming technique in ensuring maximization of profit. It seeks to illustrate the profitability of using the technique despite the peculiarities of applying it in the particular economic environment.

INTRODUCTION:

Linear Programming is a mathematical technique which is used to determine the optimal allocation of the limited resources, among the competitive activities provided all the relationships among the variables are linear. It is mainly concerned with a method of finding the optimum value (Maximum or Minimum) of a function of n variables. It is mathematical technique for finding the best optimal solution of a company. In a business setting, profit maximization is always emphasized which inevitably means the minimization of some cost function. For Linear Programming Problems, the Simplex algorithm provides a powerful computational tool, able to provide fast solution to very large-scale application. The goal of this paper is to find the maximum profit and to minimize the transportation cost of the company Gurgaon central.

Assumption for the problem:

- (i) It is assumed that the total stock used is fixed
- (ii) It is assumed that the total demand of the shoes is fixed.
- (iii) It is assumed that there is a linear relationship among the variables used in the problem

DATA PRESENTATION AND ANALYSIS FOR SHOE INDUSTRY:

The data of the paper is collected from the store Gurgaon central, Gurugram, Haryana.

Price for both the type of shoe is 5000 but the profit margin on a regular shoe is 30% and for sports is 40 %

We took the following brands for our paper:

- (i) Puma
- (ii) Nike
- (iii) Adidas
- (iv) Reebok
- (v) Under Armour

Below are the sales for the brands under regular department:

| BRAND | Monthly sales | Yearly stock |
|--------------|---------------|--------------|
| PUMA | 240 | 3500 |
| NIKE | 330 | 4000 |
| ADIDAS | 210 | 2780 |
| REEBOK | 210 | 3000 |
| UNDER ARMOUR | 120 | 1500 |

Below are the sales for the brands under sports department:

| BRAND | Monthly sales | Yearly stock |
|--------------|---------------|--------------|
| PUMA | 210 | 2500 |
| NIKE | 270 | 3680 |
| ADIDAS | 210 | 2500 |
| REEBOK | 180 | 2780 |
| UNDER ARMOUR | 60 | 900 |

MODEL FORMULATION:

Let number of pair of regular shoes be x_1

Let number of pair of sport shoes be x_2

Let Z represent the total profit to be maximize.

The linear programming problem for the above data is given by,

Maximization:

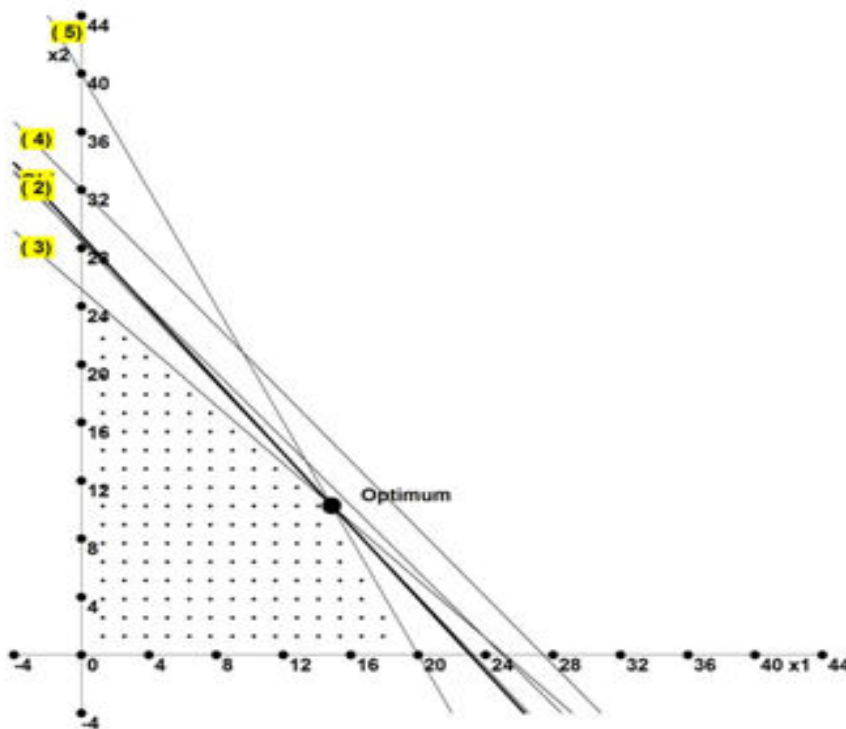
| X_1 | X_2 |
|-------|-------|
| 1500 | 1200 |

$$Z = 1500x_1 + 2000x_2$$

Subject to Constraints,

1. $240x_1 + 210x_2 \leq 6000$
2. $330x_1 + 270x_2 \leq 7680$
3. $210x_1 + 210x_2 \leq 5280$
4. $210x_1 + 180x_2 \leq 5760$
5. $120x_1 + 60x_2 \leq 2400$

SOLUTION



We get an optimal solution of above model by using simplex method:

Objective value = 34628.57

$X_1 = 14.86$

$X_2 = 10.29$

CONCLUSIONS:

The model indicates that the optimum result is derived from the data collected so the maximum profit of the company is Rs.34628.57 in a month. The profit margin for regularshoes is 14.86and for sports shoes is 10.29

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REFERENCES:

<http://www.jcreview.com/fulltext/197-1592807730.pdf>

<https://www.ijeat.org/wp-content/uploads/papers/v8i6/F9337088619.pdf>

<http://article.sapub.org/10.5923.j.ajor.20201002.03.html>