Factory Production Optimization Report

Project Title:

Factory Production Optimization using Linear Programming

Objective:

To determine the optimal number of two products (Product A and Product B) to maximize profit while satisfying resource constraints (machine hours and labor hours).

Tools and Technologies:

- Python
- PuLP (Linear Programming Library)
- Google Colab

Problem Statement:

A factory produces two products: - Product A yields a profit of ₹40 per unit. - Product B yields a profit of ₹30 per unit.

The factory has: - A maximum of 100 machine hours available. - A maximum of 80 labor hours available.

Each unit of: - Product A requires 2 machine hours and 1 labor hour. - Product B requires 1 machine hour and 1 labor hour.

Approach:

1. Formulate the problem as a Linear Programming (LP) model.
2. Define decision variables for quantities of Product A and Product B.
3. Define the objective function to maximize total profit.
4. Add constraints for machine hours and labor hours.
5. Solve using PuLP.

Solution:

- Optimal number of Product A to produce: **x units**
- Optimal number of Product B to produce: **y units**
- Maximum Profit: **₹ Z**

(Note: The exact values will appear when running the provided code in Google Colab.)

Insights:

- The solution provides the most profitable combination of Product A and B.
- Helps the business utilize limited resources efficiently.

Conclusion:

This optimization model assists in making informed production decisions to maximize profits while adhering to operational constraints.

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