

## Title

### Solving a Business Problem Using Optimization Techniques (Linear Programming) Using Python PuLP Library

#### 1. Problem Statement

In manufacturing industries, companies must decide how many units of each product to produce to maximize profit while using limited resources like machine time and labor time.

In this project, we solve a production optimization problem using Linear Programming. The objective is to determine the optimal number of products to manufacture to achieve maximum profit.

#### 2. Objective

1) Maximize company profit

2) Use limited machine and labor resources efficiently

#### 3. Conclusion

In this project, Linear Programming was used to solve a real-world business optimization problem. Using the PuLP library, we successfully determined the optimal production quantity to maximize profit.

The model ensures efficient use of machine and labor resources and helps management make better production planning decisions.

```
!pip install pulp
```

```
Requirement already satisfied: pulp in /usr/local/lib/python3.12/dist-package
```

```
from pulp import *
```

```
model = LpProblem("Profit_Maximization", LpMaximize)
```

```
x = LpVariable('Product_A', lowBound=0)  
y = LpVariable('Product_B', lowBound=0)
```

```
model += 50*x + 40*y
```

```
model += 2*x + y <= 100  
model += x + 2*y <= 80
```

```
model.solve()
```

```
1
```

```
print("Status:", LpStatus[model.status])  
print("Optimal Units of Product A =", value(x))  
print("Optimal Units of Product B =", value(y))  
print("Maximum Profit =", value(model.objective))
```

```
Status: Optimal  
Optimal Units of Product A = 40.0  
Optimal Units of Product B = 20.0  
Maximum Profit = 2800.0
```