Executive Summary

Objective: To evaluate the production and outsourcing strategies for March and propose actionable recommendations to minimize costs, optimize capacity utilization, and ensure operational efficiency.

Findings and Recommendations

A&B. We can use a linear model to create our optimization model. The objective function has a value of $1,382,544

C. Slight Upgrade Analysis

- **Findings**:
    - The upgrade adds 600 machine hours at $1,500/month.
    - Produces approximately 705.88 kg of yarn.
    - Net P/L for this upgrade is **–$223.41**, indicating a loss.
- **Recommendation**:
    - **Do not proceed** with the slight upgrade, as it results in negative returns and does not add significant value to production.

D. Renting a New Spinning Machine

- Findings:
    - Renting a spinning machine for Medium Yarn costs $3,000/month.
    - Produces 705.88 kg/month at $5.70/kg.
    - Total savings compared to the current cost is $1,023.53/month.
- **Recommendation:**
    - Proceed with renting the spinning machine, as it provides cost savings and increases production capacity for Medium Yarn.

E. New Client Demand for 6,000 kg of Medium Yarn

- **Findings**:
    - Fulfilment would increase total cost to $1,457,238.
    - Minimum price per kg to cover costs is **$12.449**.
    - Additional questions to clarify:
        - Is this a one-time or recurring order?

        - Can the client accept partial deliveries if production capacity is constrained?

- **Recommendation**:
    - Quote a price of at least $12.45/kg to cover costs and assess the client's requirements (e.g., delivery flexibility) before committing to the order.

F. Sensitivity to a 5% Cost Increase

- **Findings**:
    - A ±5% variation in internal production costs does not alter the optimal production allocation.
    - Current suppliers and production shifts remain robust under these conditions.
- **Recommendation**:
    - Maintain the current production strategy, as it remains cost-effective even with moderate cost variations.

G. Adjusting De Blasi Production

- **Findings**:
    - **Low Capacity**: De Blasi's capacity reduction requires prioritizing high-cost suppliers or renegotiating contracts.
    - **Increased Capacity**: When capacity increases, De Blasi should be utilized more due to its favorable costs.
- **Recommendation**:
    - For low capacity, negotiate overtime methods or diversify suppliers.
    - For increased capacity, allocate maximum feasible production to De Blasi to minimize costs.

H. Cost Sharing with Ambrosi Mill

- **Findings**:
    - One-time setup cost for Fine Yarn production at Ambrosi totals **$2,367.38**.
    - Sharing this cost ensures a mutually beneficial arrangement and enables production optimization.
- **Recommendation**:
    - **Share up to $2,367.38** of the one-time setup cost to enable Fine Yarn production, maintaining strong supplier relationships and long-term benefits.

I. Optimization Strategy and Validation

- **Findings**:
    - The optimized production schedule minimizes total costs to **$1,382,544** while meeting demand and capacity constraints.
    - No suppliers exceed their machine-hour limits, and all demand requirements are fulfilled.
- **Recommendation**:
    - Validate the allocation model periodically to ensure compliance with constraints.
    - Continue refining the objective function to incorporate dynamic changes, such as fluctuating costs or new supplier agreements.

Conclusion

The production and outsourcing strategies are optimized under current conditions, with actionable opportunities to:

1. Avoid unnecessary upgrades.
2. Invest in strategic capacity expansion (e.g., renting the spinning machine).
3. Negotiate cost-sharing and alternative supplier arrangements to manage risks and maximize savings.

This approach ensures cost efficiency, operational flexibility, and alignment with client demands.