**Supply Chain Logistics Analysis Report**

**Summary Report**

**1. Executive Summary:** The analysis aimed to optimize the routing of orders from warehouses to customers to minimize overall costs while adhering to constraints such as warehouse capacities, product-specific storage limitations, and transportation costs.

Using Tableau for data visualization and linear programming (LP) for cost optimization, the project identified key strategies for cost reduction and operational efficiency. The findings suggest that expanding warehouse capacities and renegotiating freight rates are effective ways to lower costs and enhance logistics.

**2. Detailed Analysis:**

* **Historical Costs:** Analyzed historical data revealed substantial spending on storage and freight. Freight costs were found to be the largest expense, highlighting the need for targeted cost-saving measures.
* **Capacity Utilization:** The analysis of warehouse capacities showed that some warehouses are operating close to their limits. Identifying these warehouses enabled targeted recommendations for capacity adjustments.
* **Optimization Results:** The LP model demonstrated that increasing warehouse capacities by 20% or decreasing freight rates by 10% could significantly reduce total costs. This solution optimized routing while meeting customer demands and operational constraints.

**3. Insights from Scenario Analysis:**

* **Increase Capacity by 20%:** This adjustment led to a reduction in total costs, indicating that additional warehouse space could alleviate operational pressures and enhance routing efficiency.
* **Decrease Freight Rates by 10%:** Lowering freight rates also contributed to cost savings, suggesting that renegotiating transport contracts or seeking alternative providers could be beneficial.
* **Adjust Product Compatibility:** Changes in product compatibility constraints impacted routing and costs, highlighting the need for strategic alignment between product availability and warehouse capabilities.

**4. Potential Cost-Saving Strategies:**

* **Capacity Expansion:** Invest in increasing warehouse capacities to improve order fulfillment and reduce the risk of bottlenecks.
* **Freight Negotiations:** Explore options for reducing freight rates, such as negotiating with current providers or switching to more cost-effective transport solutions.
* **Product Availability Management:** Align product availability with warehouse storage capabilities to optimize costs and prevent unnecessary expenses.

**5. Goal Solution:** To achieve the goal of minimizing overall costs while fulfilling constraints, the project employed a linear programming model that optimized order routing based on historical costs, capacity constraints, and product availability.

The model's results demonstrated that strategic capacity expansion and freight cost reduction are effective solutions for achieving cost efficiency and operational excellence in the supply chain.

**Executive Summary**

The project analyzed order routing optimization from warehouses to customers, aiming to minimize overall costs while adhering to operational constraints such as warehouse capacities, product storage limitations, and transportation costs. The study utilized linear programming to identify cost-saving opportunities and enhance logistical efficiency.

**Findings:**

1. **Cost Distribution:** Freight costs were identified as the largest expense, significantly impacting overall logistics costs.
2. **Capacity Utilization:** Some warehouses are operating near their capacity limits, which may lead to inefficiencies and increased costs.
3. **Optimization Results:** The linear programming model revealed that increasing warehouse capacities and reducing freight rates are effective strategies for cost reduction.

**Recommendations:**

1. **Increase Warehouse Capacities:**
   * **Action:** Expand warehouse capacities by up to 20% where feasible.
   * **Benefit:** This will alleviate storage constraints, improve order fulfillment efficiency, and reduce the likelihood of bottlenecks.
2. **Negotiate Freight Rates:**
   * **Action:** Seek to reduce freight rates by approximately 10% through renegotiations with current providers or exploring alternative logistics partners.
   * **Benefit:** Lower freight costs will directly decrease total logistics expenses and improve overall cost-efficiency.
3. **Optimize Product Compatibility:**
   * **Action:** Ensure that product availability aligns with warehouse storage capabilities and order requirements.
   * **Benefit:** Improved alignment will enhance routing efficiency and reduce unnecessary costs associated with product storage and distribution.

By implementing these recommendations, the organization can achieve significant cost savings and operational improvements, leading to a more efficient and cost-effective supply chain.