

SkyLink: Revolutionizing Global Airplane Spare Parts Logistics

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AGENDA

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1. Introduction To The Problem



Urgency

Immediate Part Replacements Needed During Maintenance Checks



Unpredictability

Spare Parts Demand is Unpredictable, Leading to Logistical Complexities



Costliness

Grounded Airplanes Incur Heavy Financial Losses, Including Lost Revenue and Penalties

Our Approach Towards This Problem



Our Aim

Designing a Global Logistic Network
For Plane Spare Parts



The Goal

Optimization Measured By Minimizing
Downtime and Other Associated Costs



Benefits

Reduces Costs, Enhances Operational
Efficiency

2. Leveraging Gurobi With Python



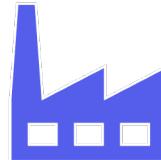
Power of Gurobi

- High Performance, Scalable
- Robust and Reliable
- Seamless Python Integration

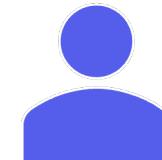
Understanding Our Decision Variables



Depot in Use
(d_{j})

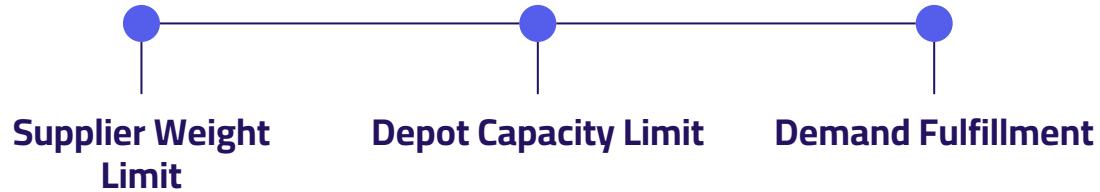


Costs Associated with Shipment
from Supplier to Depot
($s_{d\ s,p,j}$)



Costs Associated
with Shipment from Depot to
Customer Location
($d_{c\ j,p,k}$)

The Constraints of the Model



Compartments to the Objective Function

Minimize

Fixed Cost for Using
Depot

Transportation
Costs from
Suppliers to
Depots

Transportation
Costs from
Depot to
Customers

The Size of The Model

Model Complexity	
Variables	320,948
Constraints	338,587

3. The Optimal solution using a 5\$ service level

\$ 5,004,750.46

Optimal Logistics Costs: Depot Operations
and Transportation From Supplier to Client



Understanding the Fixed and Variable Costs

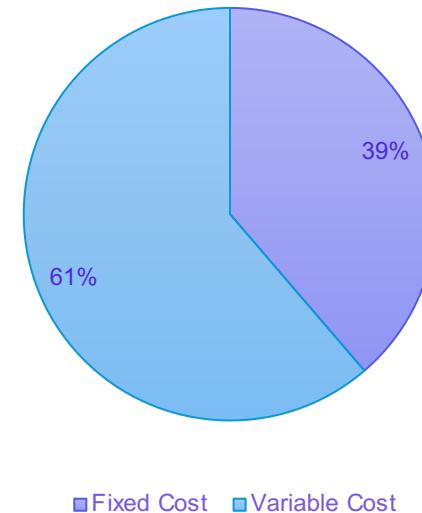
\$ 1,937,637.00

Fixed Cost for Operating Depot

\$ 3,067,113.46

Variable Cost = Transportation Cost From Supplier +
Transport Cost to Customer

Cost Breakdown



4. Taking a Look Into Depot Utilization

Depot	Total Parts Passed (Units)	Total Parts Weights Passed (Kgs)	Capacity Utilization (%)
D1	300000	519004.80	100
D2	150000	252319.14	100
D3	59901.11	97717.06	39.93
D4	141643.32	228051.27	94.43
D16	150000	248064.30	100
D17	150000	237623.95	100

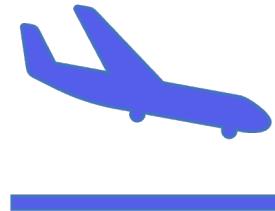


Visualizing Customer Allocation

5. What Does 'Within Range' Mean for Our Service Level?



"Within range"
Means the Ability to
Deliver Parts Within
the Service Level
Time Frame

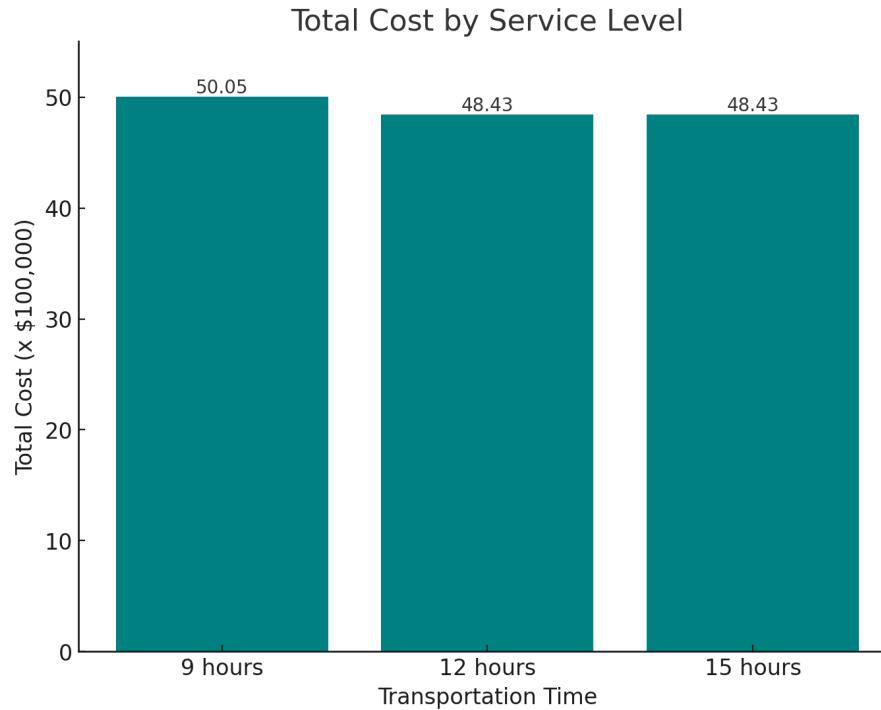


Target: Every
Country Must be
Within a X-hour
Flight of an Open
Depot



Associated Costs
With Operating at
the Selected
Service Level

Cutting Costs with Longer Transportation Times

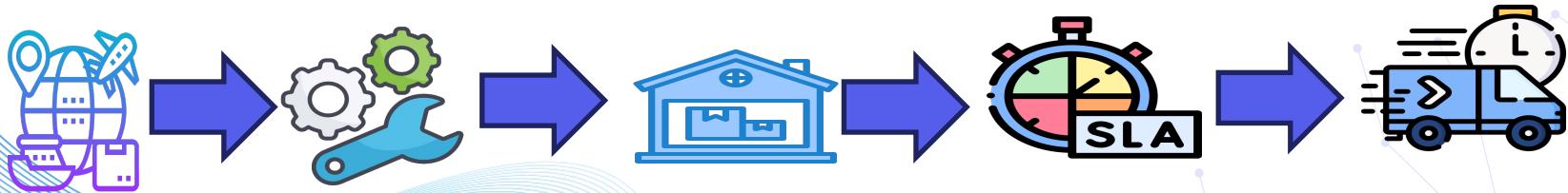


Each of These Options Consists of
6 Open Depots

Savings = **\$161,883.75**

6. Our Recommendations

- Design an Efficient Logistics Network Leveraging on Linear Programming
- Strategic Depots Based on Capacity to Handle Shipments and Geographical Location
- Minimizing Costs via Longer Service Times to Reduce Operating Costs by 3%



Questions & Answers