

Vision Corporation: Production Planning and Shipping Vision is a large company that produces video capturing devices for military applications such as missiles, long-range cameras, and aerial drones. Four different types of cameras (differing mainly by lens type) are made in the three plants in the system. Each plant can produce any of the four camera types, although each plant has its own individual constraints and unit costs. These constraints cover labor and machining restrictions, and the specific values are given in Tables 1–3. Note that even though the products are identical in the three plants, different production processes are used and thus the products use different amounts of resources in different plants. The corporation controls the material that goes into the lenses; the material requirements for each product are given in the last column of Tables 1-3. A total of 3,500 pounds of material is available for the entire system during the planning period.

Table 1: Product-Resource Constraints: Plant 1

Products	Labor (Hours/Unit)	Machine (Hours/Unit)	Material (Lb./Unit)
Small	3	8	1.0
Medium	3	8.5	1.1
Large	4	9	1.2
Precision	4	9	1.3

Total available:

- Labor: 6,000
- Machine: 10,000

Table 2: Product-Resource Constraints: Plant 2

Products	Labor (Hours/Unit)	Machine (Hours/Unit)	Material (Lb./Unit)
Small	3.5	7	1.1
Medium	3.5	7	1.0
Large	4.5	8	1.1
Precision	4.5	9	1.4

Total available:

- Labor: 5,000
- Machine: 12,500

Table 3: Product-Resource Constraints: Plant 3

Products	Labor (Hours/Unit)	Machine (Hours/Unit)	Material (Lb./Unit)
Small	3	7.5	1.1
Medium	3.5	7.5	1.1
Large	4	8.5	1.3
Precision	4.5	8.5	1.3

Total available:

- Labor: 3,000
- Machine: 6,000

Transport has 3 major customers (RAYco, HONco, and MMco) for its products. The maximum sales for each customer–product pair is given in Table 4. Product sales prices are given in Table 5, and the shipping costs from each plant to each customer are detailed in Table 6. Table 7 contains the production costs for each product–plant pair

Table 4: Maximum Product Sales (\$) per Unit

Products	Customers	RAYco	HONco	MMco
Small		200	400	200
Medium		300	300	400
Large		500	200	300
Precision		200	400	300

Tablo 5: Product Sales Price (\$) per Unit

Products	Customers	RAYco	HONco	MMco
Small		17	16	16
Medium		18	18	17
Large		22	22	23
Precision		29	26	27

Tablo 6: Shipping Costs (\$) per Unit

Plant	Customers	RAYco	HONco	MMco
1		1.0	1.6	1.1
2		1.2	1.5	1.0
3		1.4	1.5	1.3

Tablo 7: Production Costs (\$) per Unit

Products	Plant	1	2	3
Small		14	13	14
Medium		16	17	15
Large		18	20	19
Precision		26	24	23

All shipping from plants 1 and 2 that goes to RAYco or HONco must go through a special inspection. These units are sent to a central site, inspected, and then sent to their destination. The capacity of this special inspection site is 1,500 pieces. Your job is to determine a recommendation for the company. A recommendation must include a plan for production and shipping as well as the cost and revenue generated from each plant.

In addition, you should address the following potential issues in your recommendation:

- If you could get more material, how much would you like? How would you use it? What would you be willing to pay?
- If you could get more inspection capacity, how much would you like? How would you use it? What would you be willing to pay?
- At what plant(s) would you like to add extra machine hours? How much would you be willing to pay per hour? How many extra hours would you like?
- Marketing is trying to get RAYco to consider a 50% increase in its demand. Can we handle this with the current system or do we need more resources? How much more money can we make if we take on the additional demand?

NOTE: You must explain and detail decision variables, parameters, and constraints thoroughly.

- You may use Excel Solver, Lingo, CPLEX, or Python to solve the model you develop. The outputs of the model and the results obtained must include comments on sensitivity analysis and be included in the report.