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PES2PGE22MB067

Answer any two – All questions carry equal marks – $2 \times 10 = 20$ Marks

1. David Austin recently purchased a chain of dry cleaners in northern Wisconsin. Although the business is making a modest profit now, David suspects that if he invests in a new press, he could recognize a substantial increase in profits. The new press costs \$15,400 to purchase and install and can press 40 shirts an hour (or 320 per day). David estimates that with the new press, it will cost \$0.25 to launder and press each shirt. Customers are charged \$1.10 per shirt.

- a. How many shirts will David have to press to break even?

BEP units = Fixed Cost / Contribution margin per unit

Contribution Margin per unit = Selling price per unit – Variable Cost per unit

Unit Selling price = \$ 1.10

Unit Variable Cost = \$ 0.25

Unit Contribution margin = \$ 1.10 - \$ 0.25 = \$ 0.85

Total Fixed Cost = \$15400

BEP Units = \$15400 / \$0.85 = 18118 units

- b. So far, David's workload has varied from 50 to 200 shirts a day. How long would it take to break even on the new press at the low-demand estimate? at the high-demand estimate?

At Low demand estimate of 50 shirts a day $18118 / 50 = 362.36$ Days will be the days required to reach BEP

At high demand estimate of 200 shirts a day $18118 / 200 = 90.59$ Days

- c. If David cuts his price to \$0.99 a shirt, he expects to be able to stabilize his customer base at 250 shirts per day. How long would it take to break even at the reduced price of \$0.99? Should David cut his price and buy the new press?

BEP units = Fixed Cost / Contribution margin per unit

Contribution Margin per unit = Selling price per unit – Variable Cost per unit

New Unit Selling price = \$ 0.99

Unit Variable Cost = \$ 0.25

Unit Contribution margin = \$ 0.99 - \$ 0.25 = \$ 0.74

Total Fixed Cost = \$15400

New BEP Units = \$15400 / \$0.74 = 20811 units

Stable Customer base at \$0.99 = 250 Shirts per day

At 250 shirts per day the New BEP = 20811 / 250 = 83.24 Days

Since David can achieve the new BEP of 20811 units within 83.24 with a reduced selling price of \$ 0.99 compared to the old BEP of 18118 units in a minimum of 90.59 days at the old selling price of \$1.10 per shirt, **it is recommended that David reduce the selling price and invest \$15400 in the new Press.**

2. An assembly line with 17 tasks is to be balanced. The longest task is 2.4 minutes, and the total time for all tasks is 18 minutes. The line will operate for 450 minutes per day.
- What are the minimum and maximum cycle times?
 - What range of output is theoretically possible for the line?
 - What is the minimum number of workstations needed if the maximum output rate is to be sought?
 - What cycle time will provide an output rate of 125 units per day?
 - What output potential will result if the cycle time is (1) 9 minutes? (2) 15 minutes?

- What are the minimum and maximum cycle times?

Total number of tasks = 17

Time required for Longest task = 2.4 min

Total time required for all tasks = 18 min

Total Line operation time = 450 min per day

Minimum cycle time = 2.4 min

Maximum cycle time = 18 min

- What range of output is theoretically possible for the line?

Minimum output = $450/18 = 25$ units

Max. output = $450/2.4 = 187.5$ units

Theoretically possible output range for the line is between 25 units and 187.5 units

c. What is the minimum number of workstations needed if the maximum output rate is to be sought?

No. of Workstations = Total time for all tasks / time required for longest task

Time required for Longest task = 2.4 min

Total time required for all tasks = 18 min

Min. number of work stations for max out put = $18 / 2.4 = 7.5$ i.e. 8 work stations

d. What cycle time will provide an output rate of 125 units per day?

Cycle time = total line operation time / units per day

Total line operation time = 450 min

Cycle time to get output of 125 units per day = $450/125 = 3.6$ minutes

e. What output potential will result if the cycle time is (1) 9 minutes? (2) 15 minutes?

a. Output potential if the cycle time is 9 min = $450/9 = 50$ units

b. Output potential if the cycle time is 15 min = $450/15 = 30$ units

Q3) Which are factors you consider for setting up 1 million capacity of EV Car manufacturing facility and why? Suppose three states are competing for such EV Mfg facility such as Karnataka, TN and AP and explain at least 2 methods used to assess these three locations.

The main factors to be considered for setting up a EV manufacturing facility of 1 million units capacity would be :

- Availability of large Land parcels
- Availability of skilled Labour in large supply. This will be evident if the location has plenty of educational and vocational training institutions.
- Availability of Electricity and water in abundance
- Good infrastructure and connectivity with ports / airports / train and road networks for smooth supply of raw materials and finished goods.
- Ease of doing business ranking of the state.
- Attractive SOPS for setting up of Green industries like Tax holidays / GST Rebates / reduced import duty on raw material / reduced water and electricity tariff etc.
- Demography of the country and status of Demand for Future ready products like EV

The Location analysis methods are :

1. Quantitative Methods
2. Qualitative Methods
3. Semi-Quantitative Methods

Plant Location Techniques under the Quantitative and Qualitative methods are

- The Factor-Rating Method
- Location Break-even Analysis
- Centre-of-Gravity Method
- Load-DistanceMethod
- Transportation Method
- Brown Gibson Model