

EM384: Analytical Methods for Engineering Management

Lesson 26: Site Selection Problems

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Lesson Objectives

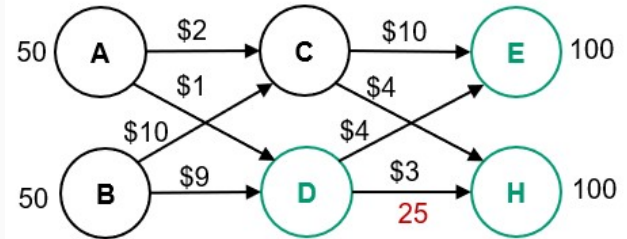
Lesson Objectives

- Recognize a site selection problem given a transportation problem.
- Formulate and solve in Excel a site selection problem using binary decision variables.

In Class Exercise

Block 3 Challenge Problem

Formulate the min-cost network flow problem to the right as a site selection problem, with fixed costs $F_D = \$100$, $F_E = \$50$ and $F_H = \$75$. Then solve using Excel. Which sites are not in use?



Solution

Decision Variables:

x_{ij} is the flow from node i to node j ,

$\forall i \in \{A, B, C, D\}, j \in \{C, D, E, H\}$ and $i \neq j$

y_D, y_E, y_H are binary decision variables where $y_i = 0$ means site i is not selected, and $y_i = 1$ means site i is selected, $\forall i \in \{D, E, H\}$

Objective Function:

Minimize

$$Z = 2x_{AC} + x_{AD} + 10x_{BC} + 9x_{BD} + 10x_{CE} + 4x_{CH} + 4x_{DE} + 3x_{DH} + 100y_D + 50y_E + 75y_H$$

Constraints:

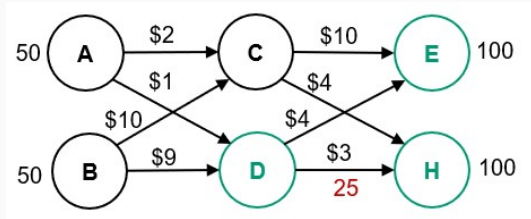
$$x_{AC} + x_{AD} = 50$$

$$x_{BC} + x_{BD} = 50$$

$$x_{CE} + x_{DE} \leq 100y_E$$

$$x_{CH} + x_{DH} \leq 100y_H$$

$$x_{AC} + x_{BC} = x_{CE} + x_{CH}$$



$$x_{AD} + x_{BD} = x_{DE} + x_{DH}$$

$$x_{AD} + x_{BD} \leq 100y_D$$

$$x_{DH} \leq 25$$

$$x_{AC}, x_{AD}, x_{BC}, x_{BD}, x_{CE}, x_{CH}, x_{DE}, x_{DH} \geq 0$$

$$y_D, y_E, y_H \in \{0, 1\}$$

Conclusion

Homework:

- Review Lessons Lessons 13 - 26

Next Lesson:

- WPR 2 (MH404), during the regular class period.