ISM 125/225, LECTURE #16 (2/25/10)

Agenda:

1. Inventory Management: Summary
2. Facilities & SC Network Design
3. Homework #6
4. Project

ISM Faculty Undergrad Lunch
(ISMFUL)
FRIDAY 12 Noon - 1 PM
E25 Room 215

- Internships
- Professor Yi Zhang, DataMining
INVENTORY MANAGEMENT

Cycle Inventory
is all about
Efficiency, as
in "Economies
of Scale"

Safety Inventory
is all about
Responsiveness,
as in making
product available
to the customer

What is the
optimal lot
size \( Q^* \), to
minimize
total cost

\[ \text{material cost} + \text{transportation cost} + \text{inventory holding cost} \]

What is the
safety stock \( S_S \)
to meet a
target or
desired metric
of product availability

\[ \text{CSL} \]

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Comment: Aggregation helps to reduce \( S_S \) (defer discussion to week 10)
SC Network

Two remaining key drivers

- Facilities (Chapters 4, 5 of text, Third Edition)
- Transportation

FACILITIES

location of facilities function of facility (production, warehouse, ....) & capacity

Time-Horizon for making decisions about facilities is usually several months to years

Assumption: The selected facilities will serve desired (selected) markets (demand centers) for a reasonable amount (years) of time
Process for facilities design

Phase I: Define the supply-chain strategy for the "facilities" driver to be aligned with the overall supply-chain strategy & competitive strategy

Responsiveness

Cost

Efficiency

Phase II Define the regional facility configuration

1. Facility Role: What is the purpose (function) of the facility: production, warehousing...
2. Facility location: where?

3. Capacity allocation: how much capacity? ("size")

4. Market (demand): which markets and supply allocation or demand regions should each facility serve? (SC Network decisions)

Need a model to optimize facilities demand

CAPACITATED PLANT (facility)

LOCATION MODEL
Given:

\[ D_j \ (j=1,2,\ldots,m) \] : Demand for region \( j \)

\[ K_i \ (i=1,2,\ldots,n) \] : Capacity of plant (facility) \( i \)

\[ f_i \ (i=1,2,\ldots,n) \] : Fixed annualized cost of operating plant \( i \)

\[ c_{ij} \ (i=1,2,\ldots,n), \ (j=1,2,\ldots,m) \] : Cost of producing, storing, and shipping one item from plant \( i \) to region \( j \)

Facilities Design Variables:

\[ Y_i \ (i=1,2,\ldots,n) \] : Should plant be operational \((Y_i = 1)\) or not \((Y_i = 0)\) ?

\[ X_{ij} \ (i=1,2,\ldots,n), \ (j=1,2,\ldots,m) \] : Quantity of items shipped from plant \( i \) to region \( j \)