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Supply Chain Configuration assignment – due April 27, 2005

Consider a simple supply chain for a product, such as a medical instrument.

The instrument is assembled from three parts: Part A; Part B; Part C. The instrument is distributed through two company-owned distribution centers, one in North America and one in Asia.

We are given the following data for the stages (or nodes) in the supply chain:

	Cost per Unit ($/unit)	Lead Time (days)
Part A	80	25
Part B	15	30
Part C	5	50
Assembly	20	10
NA DC	20	2
Asia DC	25	5

The cost per unit is how much cost is added at that stage of the supply chain. The lead time si the amount of time it takes the stage to replenish its inventory, given its inputs are available. Assume each stage operates with a daily periodic review system and with a base stock inventory policy. We assume an annual inventory holding cost rate of 20%.

The daily demand at the NA DC has mean 2 and standard deviation of 1; the daily demand at the Asia DC has mean 2 and standard deviation of 2. Assume 250 days per year.

We can use the PowerChain tool (introduced in H1) to find the minimal safety stock levels for this supply chain, where we assume each DC wants to provide a 95% service level:

	Exp. Safety Stock (units)	Exp. Pipeline Stock (units)
Part A	0	100
Part B	8.2	120
Part C	18.4	200
Assembly	21.8	40
NA DC	2.4	4
Asia DC	7.4	10

The expected holding cost for the supply chain safety stock is $844 per year; the expected holding cost for the pipeline stock is $3409 per year.

For the following questions, you may use PowerChain to develop an answer. Alternatively, you can develop your own analysis. If you were not in H1 class and not

familiar with PowerChain, it is OK to just describe how you would address these questions. You should answer each question separately.

a. The current replenishment of the Asia DC is by air freight. Suppose there were an option to ship the items by boat; for this option the cost per unit would be $18 and the lead time would be 20 days. We assume you need to choose one option: air or boat. Which do you prefer? Why?

b. The current assembly lead time is 10 days. By adding additional labor and dedicating an assembly line to this product, the firm can reduce this lead time to three days. The per-unit assembly cost would increase to $22 per unit. Should the firm adopt this option?

c. Another available option is to reduce the led time for the parts. For each part the lead time can be reduced by 5 days by paying a 1% premium; that is for part A, the lead time can be reduced to 20 days, but the unit cost will increase to $80.80. Should the firm adopt this option for any of the parts?