

# Assignment: the darby company manufactures and distributors

[Business](#), [Company](#)



## Case Notes:

1. This is an individual assignment. As stated in the syllabus you must do your own work or you will fail the class.
2. You can use any software you wish to perform the analysis, but the assignment was designed under the assumption that you would be using the LINDO software used for LP in BA555.
3. The project is due at the beginning of class in week four (February 1).

The Case: The Darby Company manufactures and distributes meters used to measure electric power consumption. The company started with a small production plant in El Paso, Texas, and gradually built a customer base throughout Texas, distribution center (DC) was established in Ft. Worth, Texas, and later as business expanded to the North, a second distribution center was established in Santa Fe, New Mexico. The El Paso plant was expanded when the company began marketing its meters in Arizona, California, Nevada, and Utah. With the growth of the West Coast business, the Darby Company opened a third distribution center in Las Vegas, Nevada and just two years ago opened a second manufacturing plant in San Bernardino, California. Manufacturing costs differ between the company's two production facilities.

The cost of each meter produced at the El Paso plant is \$10.50. The San Bernardino plant is more efficient and produces meters at \$10.00 a unit. Due to the company's rapid growth, not much attention has been paid to the efficiency of the distribution system, but Darby's management has decided that it is time to address this issue. The costs of shipping a meter from each

of the plants to each of the three distribution centers are shown. Yearly production capacity is 30,000 units at the El Paso plant and 20,000 units at the San Bernardino plant. Note that no shipments are allowed from the San Bernardino plant to the Ft. Worth distribution center. The company serves nine customer zones from the three distribution centers. The forecast of the number of meters needed in each customer zone for the following year is given. The Unit costs of shipping from each distribution center to each customer zone are given. Note that some of the distribution centers can not serve certain customer zones. In the current distribution strategy demand at the Dallas, San Antonio, Wichita, and Kansas City customer zones are satisfied by shipments from the Ft.

Worth DC. In a similar manner, the Denver, Salt Lake City, and Phoenix customer zones are served by the Santa Fe DC. And the Los Angeles and San Diego customer zones are satisfied by the Las Vegas DC. To determine how many units to make at each plant, the customer demand forecasts are aggregated at the distribution centers, and a transportation model is used to minimize the costs of shipping from the production plants to the distribution centers. Issues the company wants you to address.

1. If the company does not change its distribution strategy what will its manufacturing and distribution costs be for the following quarter? Suppose the company is willing to change its distribution strategy so that customer zones could be served from any distribution center for which costs are available. Would this reduce the total costs? If so by

how much? Would you make this change? Please be sure to examine all supply chain implications beyond just direct dollars saved.

2. The company wants to explore the potential of direct shipping from the plants to certain customer zones. Specifically, the shipping cost is \$. 30 per unit from San Bernardino to Los Angeles and \$. 70 from San Bernardino to San Diego. The cost for direct shipments from El Paso to San Antonio is \$3. 50 per unit. Should the company do direct shipping? If so on which routes?
3. In 3 years demand is expected to have increased 30% on average across all customers. At that time the company expects to have saturated the markets they presently serve (in other words additional growth will have to come from new markets). It will cost 3 dollars a unit to increase capacity at the El Paso plant and 4 dollars a unit at the San Bernardino plant. How much capacity, if any, would you add to each plant to satisfy future demand?

#### Instructions:

1. When answering the questions it is expected that you address the following:
  - a. What is the mathematically optimal way to meet all demands and constraints at the minimal cost? You must use LP to answer this question.
  - b. The LP model gives you the minimum cost solution. What assumptions are you making if you implement the optimal solution from the model?

2. At a minimum please to be sure to consider:

- a. Quality
- b. Delivery reliability and speed iii. Managing logistics. Optimizing the supply chain.
- c. Customer satisfaction

3. You must turn in a disk (floppy, cd, or DVD) that contains all models you used to write the paper. The disk should contain the models and solutions. Assignments that are not accompanied by a disk with the models and solutions will lose 30%. You can not turn your models and solutions in late.

4. You may use any software supported by the COB you wish- but Dr. Pagell will be using LINDO.

5. Your assignment will have an appendix where the models are explained, Please use typical LP nomenclature (let statements and the like). If the professor can not figure out what the variables in your models represent you will lose points.

6. You will have a second appendix with a print out of your results. If you run multiple models you will need to print out results from all of the runs.

7. When it comes to formatting you do what you think is best to answer the questions with the following expectations/limitations:

- a. You will turn in a well written, grammatically correct, logically consistent paper.
- b. The presentation will be a professional. Everything should be typed, easy to read, laid out in a logical manner, and so on. Make sure you tell

the reader where to find information. For instance, if you are using a dual price to answer a question say so. And tell the reader where to find this information in the paper. I am not going to guess where information comes from.

- c. This is a paper, not a 4 questions test. I expect you to write a paper that integrates all four questions. Papers, where each question is in its own stand-alone section with no linkages to other sections of the paper, will get lower grades than papers that integrate the information.

Grades: Your grade will be based on the proper formulation, solution, and interpretation of the models. Formulation and solutions will be worth 70% of your grade and interpretation will be 30% of your grade. The instructor reserves the right to give bonus points to students who come up with very elegant formulations. Table 1 Shipping cost per unit from production facilities to distribution centers.