

MEMORANDUM

Date: March 14, 2007(*Revised 04/23/2007*)

Subject: Milliken Distribution Center Location

To: Matt Ford

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Introduction

As requested, the distribution center for products from the four maquiladoras facilities has been investigated. The focus of the investigation was on determining the best distribution center location. Following is the finding.

Conclusion

- The coordinates of the best distribution center is at 229.5 miles east and 284.9 miles north -- (229.5, 284.9).
- Exploring the depth of maquiladoras, research has resulted in finding that maquiladoras are very movable. This characteristic must be weighed in order to determine the best distribution center.

Analysis

Method. Transportation cost per unit (T), volume of fabric in yard (V), and coordinates in the direction being evaluated (Z) were given by Milliken. The center of gravity method, including the use of a map showing the location of destinations, is used to determine the best location for a distribution center for products from the four maquiladoras. The formula is given below:

$$* C_x = (\text{SUM TVZ}_x) / (\text{SUM TV})$$

$$* C_y = (\text{SUM TVZ}_y) / (\text{SUM TV})$$

We assumed that the quantity to be shipped from the center of gravity – the best distribution center – to each of the four maquiladoras facilities is fixed, and the given data is reliable and accurate.

Graphic Location. The center of gravity method is a method that is used to determine the location of the distribution center that will minimize distribution costs to calculate the best location. The formulas and data that are used are shown below in

table 1:

Table 1: The Center of Gravity Data and Formula

Site	Weekly Volume (V)	Transportation Cost (T)	Location (Zx,Zy)
A	4500	5	(375,345)
B	3800	9	(410,160)
C	9000	7	(95,400)
D	7000	4	(195,130)

* $C_x = (\text{SUM } TVZ_x) / (\text{SUM } TV)$

* $C_y = (\text{SUM } TVZ_y) / (\text{SUM } TV)$

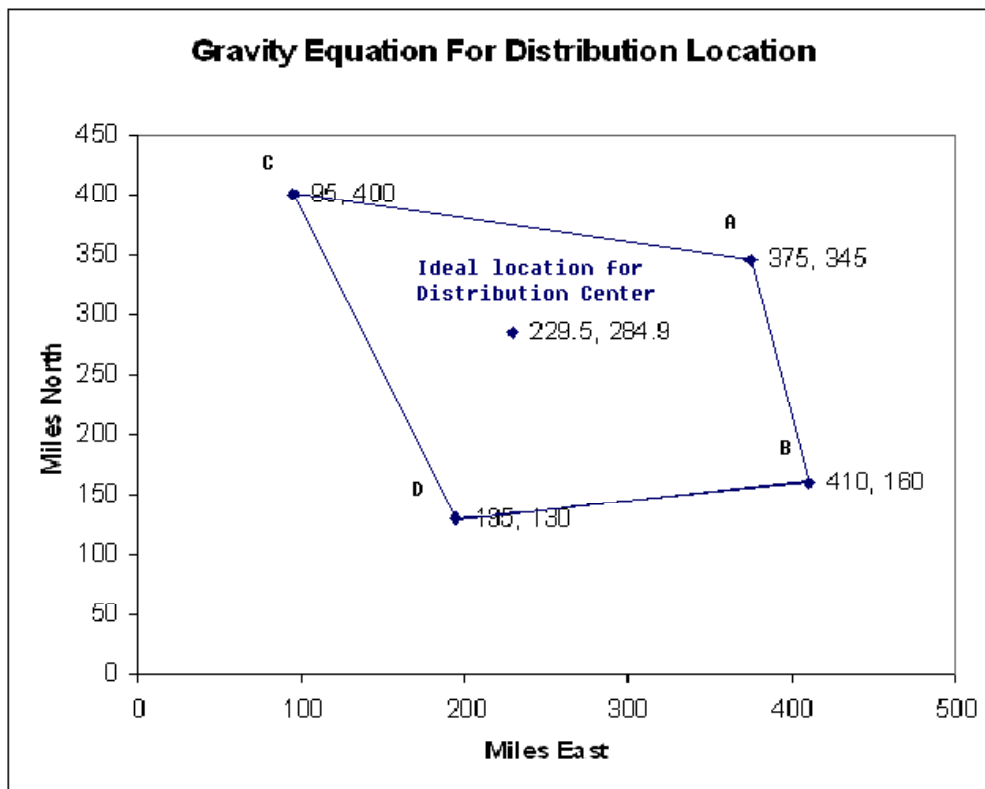
This method includes the use of a map that shows the location of the four maquiladoras Milliken & Company is interested in. The calculated ideal location should be in the range of the four locations. Calculations are listed below:

$X = (5 \cdot 4500 \cdot 375 + 9 \cdot 3800 \cdot 410 + 7 \cdot 9000 \cdot 95 + 4 \cdot 7000 \cdot 195) / (5 \cdot 4500 + 9 \cdot 3800 + 7 \cdot 9000 + 4 \cdot 7000) = 229.5$

$Y = (5 \cdot 4500 \cdot 345 + 9 \cdot 3800 \cdot 160 + 7 \cdot 9000 \cdot 400 + 4 \cdot 7000 \cdot 130) / (5 \cdot 4500 + 9 \cdot 3800 + 7 \cdot 9000 + 4 \cdot 7000) = 284.9$

Based on the calculations, the best distribution location is at 229.5 miles east and 284.9 miles north. The graph is shown in figure 1.

Figure 1: Center of gravity



Movability. Our research of maquiladoras has resulted in finding that maquiladoras are found to close shop and move around a lot. Support data are found in Julia Preston and Samuel Dillon's article on *BusinessWeek*, which introduced "independent unions and better working conditions into the foreign-owned maquiladoras factories along the U.S.-Mexico border ." on March 29, 2004.¹ Firms are seeking to increase profits; they try to move to another zone where wages remain low and the incentive package generous. Why this moving could happens? The reason is "because of the dollar's impact on import prices, retail apparel prices have fallen 3% over the past year."² And "the strong dollar is just wiping manufacturing out,"³ says Cass Johnson, an associate vice-president at the American Textile Manufacturers Institute, in his *BusinessWeek* interview. This has forced many changes within the Maquiladora industry in Mexico by causing many of them to shut down and move on to a new location, such as China and Korea which can provides lower wages and largely producing ability. The energy saving is also important for the Maquiladoras to survive. For instance, "the labor cost for assembling printed-circuit boards--the guts of electronics gear--is about \$7 to \$8 an hour in the U.S., vs. about 50 cents an hour in China."⁴ This is a huge saving for moving facilities to China. These are the ways in which we may forecast and hedge against shops moving.

What could go wrong? If a city isn't attractive enough, a Maquiladora may change locations. There could be a change in the variables of location, transportation, or volume. Maquiladora's are known to move around a lot. We must be aware of the possibilities and try to hedge risks.

Hedging. To avoid the problems that might be found with Maquiladoras changing locations, we must be able to hedge the risks. There are a few things that may be done, like building relationships with managers of the Maquiladora, making sure Maquiladoras are in economically stable cities, giving skilled technical support, and by creating the opportunity to be movable. If the work environment is unstable then Maquiladoras may move away rather than risk the financial problems of having to deal with an organized workforce. We must be aware of this risk, and keep clear of Maquiladoras with a propensity for employee problems. Tracking how often individual Maquiladora's move may help to foresee future problems.

¹ Julia Preston and Samuel Dillon. Mexican Renaissance. *BusinessWeek*.

http://www.businessweek.com/magazine/content/04_13/b3876055_mz005.htm?chan=search. March 24, 2004

² Peter Coy. Where the Recovery Won't Reach. *BusinessWeek* .

http://www.businessweek.com/magazine/content/02_19/b3782089.htm?chan=search. May 13, 2002

³ Peter Coy. Where the Recovery Won't Reach. *BusinessWeek* .

http://www.businessweek.com/magazine/content/02_19/b3782089.htm?chan=search. May 13, 2002

⁴ Peter Coy. Where the Recovery Won't Reach. *BusinessWeek* .

http://www.businessweek.com/magazine/content/02_19/b3782089.htm?chan=search. May 13, 2002