

MEMORANDUM

Date: November 14, 2004

Subject: Center of Gravity Determination

To: Director of Mexican Operations

From: Brandon Szczesniak

Background

As requested, the best location for a shipping center has been identified. The focus for obtaining this location is to minimize shipping costs from the four maquiladoras we receive product from.

Summary

Ideal location established. Utilizing the given coordinates of the four maquiladoras and the quantities shipped by each, the center of gravity method was employed to obtain the ideal coordinate for the shipping center (6.0, 7.0).

Prospective issue. Explore the depth of the downward trend that has resulted in more than 500 maquiladoras being liquidated since the beginning of the decade.

Lease facility. Investigate the possibility of leasing a facility in close proximity to the ideal coordinate. The facility should serve to avoid a high lock in while providing a profitable margin by reducing shipping costs until it is determined if the trend will affect the four maquiladoras we receive product from.

Discussion

Methods. Having access to the maquiladoras coordinates and quantities shipped allowed for a straightforward approach. Due to the lack of additional constraints, the ideal shipping center location was numerically expressed using the center of gravity method. The center of gravity method is often employed to determine a location that will minimize distribution costs. In short, distribution cost can be treated as a linear function of the distance and the quantity shipped with the following formulas:

$$x = \frac{\sum x_i Q_i}{\sum Q_i} =$$

$$y = \frac{\sum y_i Q_i}{\sum Q_i} =$$

The method also includes the use of a map that shows the location of destinations. A coordinate system is overlaid on the map to determine relative locations. Once the coordinate system is in place, you can determine the coordinates of each destination (the maquiladoras). After the calculations have been performed, you can then determine the coordinate of the center of gravity.

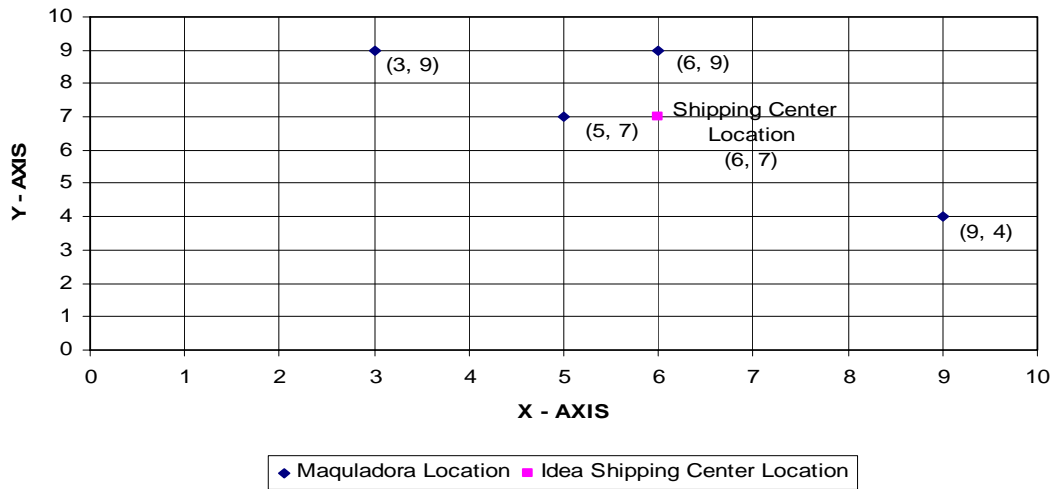
Ideal location established. The ideal location for the potential shipping center has been determined by applying the coordinates that have been issued for the four maquiladoras, location A (5,7), location B (6,9), location C (3,9), and location D (9,4) and their weekly quantities shipped (15, 20, 25, 30) respectively to the above formulas. The result is the center of gravity coordinate (6,7) as numerically illustrated below.

$$x = \frac{5(15) + 6(20) + 3(25) + 9(30)}{90} = 6.0$$

$$y = \frac{7(15) + 9(20) + 9(25) + 4(30)}{90} = 7.0$$

Figure 1 displays the center of gravity in relation to the four maquiladoras over a coordinate system.

FIGURE 1: MAQUILADORAS AND THE CENTER OF GRAVITY



Prospective issue. Since the beginning of the decade, there have been approximately 500 maquiladora plants shut down. Although the usual causes of maquiladora fluctuations are U.S. demand and Mexican cost factors, a significant share of the downturn in the textile industry is due to changes in trade policy and increased competition abroad. By observing chart 1, we see that employment for textiles grew from 1998 through mid 2000, but it fell hard after reaching its peak. Although the United States' recession is responsible in part for this dramatic downward movement, a large portion of it reflects the decision our policymakers made in allowing China and the Caribbean Basin Initiative countries the same trade openings that NAFTA offered Mexico. As a result, both China and the Caribbean Basin Initiative countries drastically reduced the competitive advantage Mexico enjoyed in the United States. In the end, it seems unlikely that Mexico will be able to compete again in the lowest wage, low-skill markets that much of this industry occupies.



Lease facility. With the crisis of the textile sector in Mexico a conservative approach may be to avoid a high lock in scenario. I suggest leasing a facility in or around the established center of gravity. This conservative approach will provide us the freedom to relocate our shipping center at a substantially lower cost in the event that one of our four maquiladoras is impacted by the external competitive pressures. Also, we may wish to consider looking at China's competitiveness as a way to reduce our costs. Leasing grants us time and freedom by allowing for an immediate reduction in shipping costs with a low lock in. In short, our business increases its margin immediately by eliminating construction cost in addition to a quick drop in shipping expenses from our Mexican alliances while allowing us to keep our eyes on the trend and the flexibility to seek opportunities in other markets.

MF comment: Only thing missing from this memo is citations on the Maquiladora info. Strive for credible, legitimate sources such as Business Week, Wall Street Journal. On line encyclopedias such as Wikipedia are insufficient.