

The demand points were assumed to maintain their relative shares.³

Suppose the model is solved and n plants are open. Define the set J , where the n plants are located, as a subset of the 13 size-locations. To find another feasible solution to (1), impose the constraint

$$(2) \quad \sum_{j \in J} Y_j \neq n.$$

This constraint does not allow the optimal solution to be feasible. Additional optimal solutions are identified by continually imposing a new constraint for every feasible solution identified and the model resolved. This guarantees a complete enumeration only if a maximum of one plant is allowed at each size-location (Y_j). Model (1), however, allows Y_j to be any non-negative integer value. Under this condition, the restriction imposed by (2) excludes all solutions with the same zero and non-zero Y_j 's and n plants.⁴ This does not allow a complete enumeration of feasible solutions.

To avoid this problem, a series of conditional constraints can be imposed on each non-zero Y_j in the optimal solution so that only one solution is excluded. This requires more integer variables, increasing the computation time and is not used (Hillier and Lieberman, pp. 736, 737).

Identifying near optimal solutions is accomplished by utilizing the MIP-MPSX search procedure (IBM) in combination with inequality (2). First, the optimal solution is determined, and the search procedure then identifies other feasible solutions. A constraint is imposed for every feasible solution identified and the algorithm re-run.

Transition Costs

Transition costs are the costs of closing existing plants and opening new ones. They may be public costs of communities or private costs. Public costs are difficult to document and are generally subjective. Plant closings

³Other assumptions that could be used include a trend or a five year moving average; however, we do not believe that our results would be affected by a change. The reasons are twofold. First, East Coast Florida packinghouses are geographically concentrated in a remote corner of the United States with all domestic U.S. markets located to the north and west. Relatively speaking, all east Florida packinghouses will be shipping approximately the same distance to interstate demand areas. Second, the distribution cost to Florida ports is insignificant compared to packing costs as a percentage of total cost (14 and 80 percent). Thus, the main influences on packinghouse location are the location of supply and packing costs.

⁴For example, let $Y_1 = 2$ and $Y_2 = 3$ with other Y_j 's = 0. Impose restriction (2) such that $Y_1 + Y_2 \neq 5$. This excludes $Y_1 = 3$ and $Y_2 = 2$ from the feasible set of solutions.