(Pet Hotel) FamilyofPet is a pet hotel that provides pet foster care service. The FamilyofPet can accommodate large dogs and small dogs: In week 1, 6 large dogs and 12 small dogs. In the week2, there were 5 large dogs and 5 small dogs. A maximum of 15 dogs can be fostered at the same time. Each large dog needs to feed 2 kg of dog food per day, while each small dog needs 1 kg of dog food per day. In the week1, dog food costs $ 13 per kg. In the week2, dog food costs $ 15 per kg. The FamilyofPet can purchases up to 150 kg of dog food per week. At the beginning of the week1, it provides an additional space for one large dog or two small dogs. At the end of each week, each dog needs a $ 30 cleaning fee. Each large dog needs to be fed treats 5 times per day, each small dog needs to be fed treats 2 times per day, and each dog needs to feed at least 3 times on average. Determine how to meet the demand and treats requirements at minimum total cost.

Discussion:-

**Mathematical Model:-**

*Parameters (Inputs):*

(Index for type of dogs: large dogs, small dogs)

(Index for week)

Dij: Number of dog I in week j can be fostered

P: Maximum dogs can be fostered in each week; 15 dogs

S: Maximum dog foods that can be purchased in a week; 150kg

Cj: Cost to purchase one kg dog foods in week j)

M: Average times treats expected in each week; 3 times

Si: Dog foods used in kg to feed each dog i

Mi: Treat times for each dog i

F: Cleaning fee for each dog i; $30

Iij: Ending number of dog i week j

I10: Starting number of large dog; 1

I20: Starting number of small dog; 2

*Decision Variables:*

xij: Dogs i foster in week j

*Calculated Variables:*

Ending available space for dogs i in week j

Cleaning fee in week j

Cost of dog foods in week j

*Objective:*

*Constraints:*

1. Non negative constraint:

1. Ending available space for dog constraint:

;

1. Average treat times constraint:
2. Feed Cost Constraint:
3. Dog foods purchase constraint:

*Excel Implementation:* Please find the attached spreadsheet for solution.



