Sets:

K – set of distribution centers

M – set of warehouses

N – set of orders

Oi – set of items in order i

Parameters:

d(ck, wj) – distance between dc k and warehouse j

d(ck, ri) – distance between dc k and the customer placing order i

vt – weight of item t

qit – quantity of item t in order i

zjtk =

ca – capacity of trucks

Decision variables:

xik =

This objective function consists of two parts: the total travel distance of trucks between dc and warehouses, and the estimated total distance between dc and customers.