

Report to Boss

Sets

J	Set of Juices
F	Set of Fruits
Q	Set of Quarters
L	Set of locations

Data

$P_{f,j}$	Part, as a per cent figure, of a fruit $f \in F$ in a juice $j \in J$
B_j	The blend, as a per cent description, of fruit in a given juice $j \in J$
C_f	Cost in dollars per kilolitre of the purchasing and processing of a given fruit $f \in F$
$D_{j,q}$	Anticipated kilolitres of demand for a given juice, $j \in J$, in a given quarter $q \in Q$
E_q	Supply of orange juice fruit concentrate from Brisbane in kilolitres for a given quarter $q \in Q$
K_j	Determination of whether a given juice, $j \in J$ is gourmet
$H_{l,l}$	Cost, in dollars, of travel from a given location, $l \in L$, to another, $l \in L$

Variables

$X_{j,q}$	Number of kilolitres produced of a given juice, $j \in J$, in a given quarter $q \in Q$
$T_{f,q}$	Number of trucks delivering a given fruit, $f \in F$, in a given quarter $q \in Q$
$G_{j,q}$	(Purpose ?) juice $j \in J$ in a given quarter $q \in Q$
$T_{l,l}$	(Purpose ?) location $l \in L$ to a given location $l \in L$

Commented [WU1]: Needs another letter in the code, two variables for T

Objective

Commented [WU2]: How do we deal with constants in our objective? Set as data?

$$\begin{aligned} & \max \sum_{j \in J} \sum_{q \in Q} X_{j,q} * \text{sell price} - X_{j,q} * \text{blendprice for } B_j \\ & \max \sum_{j \in J} \sum_{q \in Q} \sum_{f \in F} X_{j,q} * \text{sell price} - T_{f,q} * \text{Truck load size} * C_f - X_{j,q} * B_j(\text{Orange?}) \\ & \quad * \text{Orange juice cost} \\ & \min \sum_{l \in L} T_{l,l} * H_{l,l} \end{aligned}$$

Constraints

$$\sum_{j \in J} \sum_{q \in Q} X_{j,q} \leq D_{j,q} \quad \forall j \in J, \forall q \in Q \quad (1)$$

$$\sum_{j \in J} \sum_{q \in Q} X_{j,q} * B_j(Orange?) \leq E_q \quad \forall j \in J, \forall q \in Q \quad (2)$$

$$\sum_{j \in J} \sum_{q \in Q} \sum_{f \in F} X_{j,q} * B_j[F] \leq T_{f,q} * Truck\ load\ size \quad \forall j \in J, \forall q \in Q, \forall f \in F \quad (3)$$

$$\sum_{j \in J} \sum_{q \in Q} K_j, G_{j,q} = 2 \quad \forall j \in J, \forall q \in Q \quad (4)$$

$$\sum_{j \in J} \sum_{q \in Q} G_{j,q} * X_{j,q} = X_{j,q} \quad \forall j \in J, \forall q \in Q \quad (5)$$

$$\sum_{j \in J} \sum_{q \in Q \setminus \{last\ entry\}} G_{j,q} + G_{j,q+1} \geq 1 \quad \forall j \in J, \forall q \in Q \setminus \{last\ entry\} \quad (6)$$

$$\sum_{l \in L} T_{l,l} = 1 \quad \forall l \in L \quad (7)$$

$$\sum_{l \in L} T_{l,l} = 1 \quad \forall l \in L \quad (8)$$

$$\sum_{l \in L} T_{l,l} + T_{l,l} \leq 1 \quad \forall l \in L \quad (9)$$

Commented [WU3]: How do we indicate that mathematically?

Commented [WU4]: Is this hard coding/necessary in this report? Same question for (7), (8), (9)

Commented [WU5]: How do we indicate that mathematically?

Constraint purpose:

1. Production does not exceed demand
2. Production does not exceed orange juice concentrate supply received from Brisbane
3. Production from any juice does not exceed the supply received from the trucks in that quarter
4. “if the juice is gourmet, and it’s being used, it consumes a spot” ??
5. “essentially if G then X else 0” ??
6. ProduceOnePerTwoQuarters ?
7. Only one truck arrives at each location
8. Only one truck leaves each location
9. NoTwoLocationLoops ?

Commented [WU6]: Confirm and then I will full-sentence it.