

MIP 2 Food Beverage Production

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1 Introduction

I : Set of products, 1, 2, 3, 4, 5, where 1 and 2 are foods and 3, 4 and 5 are beverages

T : Set of time periods

$X_{i,t}$: amount of product i produced at time t

$S_{i,t}$: amount of product i stored at time t

$Y_{i,t}$ 1 if product i is produced at time t , 0 otherwise

$r_{i,t}$: revenue per unit of product i at time t

$cf_{i,t}$: fixed cost of producing product i at time t

$cv_{i,t}$: variable cost of producing product i at time t

$cs_{i,t}$ variable cost of storing i at time t

Please note that $S_{i,t-1} + X_{i,t} - S_{i,t}$ is equal to the products sold

Maximize
$$\sum_{i \in I} \sum_{t \in T} r_{i,t} * (S_{i,t-1} + X_{i,t} - S_{i,t}) - cv_{i,t}X_{i,t} - cf_{i,t}Y_{i,t} + cs_{i,t}S_{i,t}$$

Subject to:

$$\begin{aligned} S_{i,t-1} + X_{i,t} - S_{i,t} &\leq d_{i,t}, & \forall i \in I, t \in T \\ X_{i,t} &\leq p_i Y_{i,t}, & \forall i \in I, t \in T \\ S_{i,t} &\leq s_i, & \forall i \in I, t \in T \\ X_{i,t} &\in Z^+, & \forall i \in \{1, 2\}, t \in T \\ X_{i,t} &\in R^+, & \forall i \in \{3, 4, 5\}, t \in T \\ Y_{i,t} &\in \{0, 1\}, & \forall i \in I, t \in T \\ S_{i,t} &\in Z^+, & \forall i \in \{1, 2\}, t \in T \\ S_{i,t} &\in R^+, & \forall i \in \{3, 4, 5\}, t \in T \end{aligned}$$