

CD2007 Semana 03 Case2Sol

Juan Carlos Martinez Ovando

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Case 2: A production plan with extra capacity

You are in charge of planning the production of a chemical product for the next four months. The monthly demand and the purchasing unit costs of raw material are listed in Table 3.6. The capacity of the plant is of 1,300 tonnes (t.) per month. The demand of a month can be covered with the production of the same month, and also with production of past months. The storage costs are of 2K EUR per tonne stocked at the end of the month. The stock of finished product at the beginning of the first month is of 200 T, and it is expected to hold the same quantity at the end of the fourth month. There are no stocks of raw material, so all stocks are of finished product.

Month	1	2	3	4
Costs (k€/t)	3	8	6	7
Demand (t)	800	900	1,200	1,800

Figure 1: **Table 2**

Objectives

1. Obtain the linear programming model that allows to obtain the production plan which minimizes the sum of production and storage costs.
2. What is the meaning of the dual variables of the constraints defined in the model?

As the demand is proven to be irregular, the plant management is considering the possibility of adding extra capacity to the plant, introducing a new shift. This new shift would increase plant capacity in 400 T per month, but also would include an extra fixed cost of 500 ke. For legal reasons, it is not possible to add extra capacity in a month if it has been added in the previous month.

3. Modify the model obtained previously to include the possibility of including extra shifts, and assess the practicality of adding extra shifts.

Solution