Management Science

Publication details, including instructions for authors and subscription information:
http://pubsonline.informs.org

Comment on "Smooth Patterns of Production"

S. Sherman,

To cite this article:
S. Sherman, (1955) Comment on "Smooth Patterns of Production". Management Science 1(3-4):271-271. https://doi.org/10.1287/mnsc.1.3-4.271

COMMENT ON "SMOOTH PATTERNS OF PRODUCTION"

S. SHERMAN

Moore School of Electrical Engineering, Univ. of Penna., Phila., Penna.

In their interesting paper (referred to later as [HJ]) "Smooth Patterns of Production", *Management Science*, vol. 1, no. 1 (1954) pp. 86–91, A. J. Hoffman and Walter Jacobs consider the problem of minimizing the cost of both carrying inventory and accelerating production while meeting a set of delivery requirements. The function used by [HJ] to measure the cost of accelerating production from x_i units in the i^{th} month to x_{i+1} units in the $i + 1^{\text{th}}$ month is

$$c(x_i, x_{i+1}) = d(x_{i+1} - x_i) = \quad 0,\ x_{i+1} \leqq x_i, \quad \lambda(x_{i+1} - x_i),\ x_i \leqq x_{i+1},$$

where $\lambda \geqq 0$.

It is the purpose of this comment to point out that the conclusions of the paper depend with differing sensitivity on the precise function d chosen. Theorems 1–3 and Corollary 1 of Theorem 3 either give conditions which imply that $X_i = R_i$, i.e., that the optimum cumulative production through period i is equal to cumulative delivery requirement through period i or state $X_i \leqq K_i$, i.e., give an upper bound to the cumulative delivery requirement through period i. These conclusions continue to hold for a cost function $d(x_{i+1} - x_i)$ which is zero for non-positive $x_{i+1} - x_i$ and is a non-negative monotone increasing function of $x_{i+1} - x_i$ for non-negative $x_{i+1} - x_i$. The details of the proof will not be given here. They depend on observing that the analogue to Hoffman-Jacobs (5), (6), (7), continues to hold for the more general class of cost functions.

Theorem 4 of [HJ] with its corollary gives an explicit algorithm for the optimum production schedule when the delivery requirements increase from month to month. This conclusion is quite sensitive to the form of the function used to measure the cost of accelerating production. Hypothetical examples of $d(x_{i+1} - x_i)$ can be given, which are 0 for non-positive $x_{i+1} - x_i$ and *convex monotone increasing* for non-negative $x_{i+1} - x_i$, while not only the algorithm *fails to give the correct solution but the qualitative features of the [HJ] solution* (i.e., the X curve coinciding with the R curve and then departing linearly from it for a stretch) *also fail to apply.*

A sufficient amount of theoretical work has been done by this time to warrant some additional effort expended in getting realistic functions for the parameters of the theory. It would be very interesting to see what these functions look like in practice.