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Viewpoints

On 'Optimal production policy with shelf life including shortages'

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We read with interest the paper by Sharma (2004). He addresses the family production problem (or the economic lot scheduling problem (ELSP) with common cycle time) with shelf-life restrictions and planned shortages. The author seems to have cited almost all the recent literature including Silver (1989, 1990, 1995), and Sarker and Babu (1993), Chowdhury and Sarker (2001), and Viswanathan and Goyal (1997). However, the author (as well as the referees) seems to have ignored the paper by Viswanathan and Goyal (2000), which effectively solves the same problem by a more superior approach.

In Viswanathan and Goyal (2000) (VG2000) it is shown that the problem with planned shortages can be formulated as a problem without shortages with adjusted values for the holding cost and shelf-life. Then the algorithm provided by Viswanathan and Goyal (1997) (VG1997) can be used to solve the problem. VG1997 is itself superior to Silver's (1995) and Sarker and Babu's (1993) approach. In Sarker and Babu (1993), only two independent options viz. (i) that of reducing production rate for item with binding shelf-life constraint and (ii) reducing cycle time are considered. Silver (1995) addresses the problem of simultaneously adjusting the production rate and cycle time. However, the approach works only for problems, where the shelf-life constraint is binding for at most one item. Moreover, in both Silver (1995) and Sarker and Babu (1995) the production capacity constraint is ignored while adjusting the production rate and (/or) cycle time. Therefore, the cycle time might have to be adjusted again in an *ad hoc* manner if the machine capacity constraint is violated after adjustments to meet the shelf life constraints.

VG1997 avoids all these problems by systematically handling all these constraints simultaneously. Moreover, the production rate for items and the cycle time is optimized simultaneously and it can handle binding shelf life constraints for multiple items. VG2000 (which uses the VG1997 method) therefore effectively solves the problem with planned shortages.

Sharma's (2004) paper uses only a partial optimization approach used in Silver (1995) and Sarker and Babu (1993). Sharma (2004) also considers an incomplete analysis of different cycle time for different items. However, as is well documented in the literature, when non-identical cycle times are used, feasible production schedules are not guaranteed for the ELSP.

The answers to the numerical example provided in Sharma (2004) also seem to be incorrect. According to our calculations E_1 (see Sharma (2004) for definition of the notation) should be \$8018.07 and E_2 should be \$7389.04. It is not clear whether this is due to mistakes in calculations or mistakes in derivations. Sharma does not provide the numerical answer for option 3 (simultaneous reduction of cycle time and production rate for item 2) which is based on Silver's (1995) approach. It turns out for this example that E_3 as well as the optimal cost using VG2000 is equal to \$7389.04. However when the machining operating cost, c, is lower in value, all the three options considered by Sharma can give solutions that are inferior to VG2000 (see also VG1997).

References

Chowdhury MR and Sarker BR (2001). Manufacturing batch size and ordering policy for products with shelf lives. *Int J Prod Res* **39**: 1405–1426.

Sarker BR and Babu PS (1993). Effect of production cost on shelf life. *Int J Prod Res* **31**: 1865–1872.

Sharma S (2004). Optimal production policy with shelf life including shortages. *Journal of the Opl Res Soc* **55**: 902–909.

Silver EA (1989). Shelf life considerations in a family production context. *International J Prod Res* **27**: 2021–2026.

Silver EA (1990). Deliberately slowing down output in a family production context. *Int J Prod Res* **28**: 17–27.

Silver EA (1995). Dealing with a shelf life constraint in cyclic scheduling by adjusting both the cycle time and production rate. *Int J Prod Res* **33**: 623–629.

Viswanathan S and Goyal SK (1997). Optimal cycle time and production rate in a family production context with shelf life considerations. *Int J Prod Res* **35**: 1703–1711.

Viswanathan S and Goyal SK (2000). Incorporating planned backorders in a family production context with shelf life considerations. *Int J Prod Res* **38**: 829–836.

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