

## **On a Stochastic Model of an Unreliable Production System with Outsourced Maintenance**

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### **Abstract**

We consider an unreliable production system with a contractual relationship with a customer for a firm delivery date. We focus on the production-related decisions of the manufacturer. We assume that production rate is constant as long as the system is up and running but the randomness in production is due to downtimes as a result of breakdowns and scheduled preventive maintenance activities. The maintenance of the production facility is outsourced to a contractor. As production output is random, the manufacturer needs to make two important decisions, viz (i) how much time to allow for production taking into account the trade-off between the penalty fee if actual production time turns out to be longer than the deadline and the inventory holding cost if the production time is shorter than the allowed time and (ii) how to design the maintenance outsourcing contract to maximize its own profit while satisfying the contractor's reservation (minimum) profit requirements. This is a finite horizon optimization problem. A regenerative stochastic process is identified and analysed to develop the cost function over the finite horizon. The optimization problem will be illustrated through numerical examples. Some managerial insights with regard to coordination and some extensions will also be provided.

### **Keywords**

Maintenance; outsourcing; reliability; channel coordination;

### **Biography**

**Moosa Sharafali**, is an Associate Professor of Operations Management (Edn.) with the Lee Kong Chian School of Business, Singapore Management University, Singapore. He holds a Ph.D. in the area of Operations Management from the National University of Singapore and a Ph.D. in Operations Research from I.I.T., Madras, India. He has held academic positions with the National University of Singapore, University of Melbourne, Australia and the University of Madras, India. His research interests include stochastic modeling of issues in queues, inventories and reliability. He has also consulted for companies in Singapore mainly in the area of logistics and supply chain management. He is a life member of the OR Society of Singapore, a member of INFORMS and DSI. His research articles have appeared in top journals like Management Science, Operations Research, Production & Operations Management, IIE Transactions, International Journal of Production Research, Journal of Applied Probability, Queueing Systems, OR Letters etc.

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