Abstract

In this paper, we develop a supply network model for a service facility system with perishable inventory (on hand) by considering a two dimensional stochastic process of the form \((L, X) = \), where \(L(t)\) is the level of the on hand inventory and \(X(t)\) is the number of customers at time \(t\). The inter-arrival time to the service station is assumed to be exponentially distributed with mean \(1/\lambda\). The service time for each customer is exponentially distributed with mean \(1/\mu\). The maximum inventory level is \(S\) and the maximum capacity of the waiting space is \(N\). The replenishment process is assumed to be \((S-1, S)\) with a replenishment of only one unit at any level of the inventory. Lead time is exponentially distributed with parameter \(\beta\). The items are replenished at a rate of \(\delta\) whose mean replenishment time is \(1/\delta\). Item in inventory is perishable when its utility drops to zero or the inventory item become worthless while in storage. Perishable of any item occurs at a rate of \(\gamma\). Once entered a queue, the customer may choose to leave the queue at a rate of \(\delta\) if they have not been served after a certain time (reneging). The steady state probability distributions for the system states are obtained. A numerical example is provided to illustrate the method described in the model.

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Index Terms

Computer Science

Keywords

Markov Process  Service Facility System  Stochastic Model  Inventory Control
Queue-inventory Model
Equilibrium Distribution