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 \( \delta \). 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 \( \phi \) 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

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