Analysis of Economic Order Quantity under Ecommerce Paradigm

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EXECUTIVE SUMMARY

There is no denying that internet and Ecommerce have ushered in a paradigm shift in the way businesses are run. Business managers have to develop and adopt new policies and practices to suit the ever-changing attendant circumstances. In this paper we revisit the traditional Economic Order Quantity (EOQ) technique of inventory management and analyze how the combinations of Ecommerce and just-in-time processes seem to affect its applicability under the new paradigm. The new EOQ or the Optimal Order Quantity (OOQ) will be a quantity geared more towards ensuring efficient production/business operations and less towards minimizing the ordering costs or inventory costs. A numerical example is examined under varying associated costs scenarios to develop useful insights; insights that seem to recommend cautious adoption of OOQ rather than EOQ to different Ecommerce business models.

Keywords: EOQ, Optimal order quantity, Inventory management, Ecommerce, Digital products

INTRODUCTION

Economic Order Quantity technique, developed nearly a hundred years ago (Harris, 1915) has enjoyed an enormous following over the past century and many an industry leader has benefited by following EOQ principles in their inventory management. The contribution of EOQ to inventory management is amply evidenced by the invariable inclusion of EOQ discussion with its many different variants in almost every textbook of Operations Management containing a chapter on inventory management practices over the past three quarters of the century (Mabert, 2007).

Over the years, researchers have spent considerable time and effort in researching various aspects of EOQ policy and its applicability under varying conditions for deterministic demand and probabilistic demand, for fixed price of product to a price that varies with quantity ordered (volume discounts), inflation effect on prices, for perishable vs. non perishable products, and for variable holding costs, just to name a few. Consider for example: Langley (1976) studied determination of EPQ under conditions of uncertainty with the intent of acquainting logistics managers with several available variations of EOQ for adoption under those uncertain conditions. Maister (1976) argued that Square Root Law is applicable to safety and cycle stocks, when the EOQ is employed. Maister was interested in risk pooling and inventory centralization and developed the “Square Root Law (SRL).” As per SRL, “total safety stock inventories in a future number of facilities can be approximated by multiplying the total amount of inventory at existing facilities by the square root of the number of future facilities divided by the number of existing facilities” (Institute for Working Futures, 2011).

EOQ continues to engage the attention of OM and OR researchers. For example, Ren (2010) studied and presented his findings of EOQ’s robustness from an annual demand, setup costs, and holding cost point of view, if these costs were to follow uniform and normal probability distributions. Tripathi et al. (2010) presented an inventory model to determine an optimal ordering policy for non-deteriorating items and time dependent demand rate with delay in payments permitted by the supplier under inflation and time discounting. The objective of current analysis is first to understand the nature of EOQ and secondly to analyze its applicability to the Ecommerce paradigm. So first we examine the basic definitions of related terms. Then we analyze to understand which of the emerging Ecommerce business models are well suited for adoption of EOQ, followed by scenarios of EOQ under different cost combinations. We will then analyze the peculiarities associated with