ABSTRAK

Kusuka Ubiku merupakan UMKM pangan yang menghadapi pengendalian persediaan akibat tingginya variasi produk dan karakteristik bahan baku yang mudah rusak. UMKM ini mengolah bahan baku alami berupa biji-bijian, umbi, sayuran, dan buah dengan total 62 varian produk. Berdasarkan hasil observasi, tingkat kerusakan bahan baku masih tinggi dan belum mencapai target perusahaan. UMKM Kusuka Ubiku menghadapi ketidakpastian ketersediaan bahan baku akibat pengaruh musim dan pasokan dari petani, permintaan yang bersifat probabilistik, dan keterbatasan kapasitas angkut kendaraan yang berpotensi meningkatkan risiko kerugian apabila tidak dilakukan pengendalian persediaan yang tepat.

Penelitian ini mengembangkan model Patriarca *et al.* (2020) dan Yan & Wang (2013) dengan berdasarkan karakteristik sistem yang ada di UMKM Kusuka Ubiku. Variabel keputusan pada penelitian ini yaitu jumlah pembelian bahan baku dan panjang siklus persediaan yang optimal. Tujuan penelitian ini adalah mengembangkan model persediaan *perishable multi item* dengan mempertimbangkan permintaan probabilistik, ketidakpastian ketersediaan bahan baku, dan keterbatasan kapasitas angkut guna meminimalkan total biaya persediaan.

Berdasarkan analisis model, diperoleh panjang siklus optimal selama 9 hari. Kuantitas pembelian pada penelitian ini bersifat dinamis dan bervariasi antar periode untuk setiap item. Total biaya persediaan selama periode pengamatan diperoleh sebesar Rp26.580.434,64 sedangkan total biaya persediaan berdasarkan kebijakan perusahaan mencapai Rp28.374.029,57. Model usulan mampu memberikan penghematan biaya sebesar Rp1.793.594,93 atau setara dengan 6,3213%. Hasil analisis sensitivitas menunjukkan bahwa waktu mulai terjadinya *stock-out* merupakan parameter paling berpengaruh terhadap total biaya persediaan, sedangkan laju deteriorasi produk dan sensitivitas pelanggan terhadap waktu tunggu memiliki pengaruh yang relatif kecil.

Kata Kunci: *EOQ, Perishable multi item*, Permintaan probabilistik, Ketidakpastian ketersediaan bahan baku, Keterbatasan kapasitas angkut

MULTI ITEM PERISHABLE INVENTORY MODEL CONSIDERING PROBABILISTIC DEMAND, UNCERTAINTY IN RAW MATERIAL AVAILABILITY, AND TRANSPORTATION CAPACITY CONSTRAINTS

(A Case Study at UMKM Kusuka Ubiku, Bantul, Daerah Istimewa Yogyakarta)

ABSTRACT

Kusuka Ubiku is a food-based Micro, Small, and Medium Enterprise (MSME) that faces inventory control challenges due to the high variety of products and the perishable nature of its raw materials. This enterprise processes natural raw materials such as grains, tubers, vegetables, and fruits into a total of 62 product variants. Based on the observation results, the level of raw material deterioration remains high and has not yet met the company's target. Kusuka Ubiku also faces uncertainty in raw material availability due to seasonal factors and supply from farmers, probabilistic demand, and limited vehicle transportation capacity, which may increase the risk of losses if proper inventory control is not implemented.

This study develops the models of Patriarca et al. (2020) and Yan and Wang (2013) based on the characteristics of the system at Kusuka Ubiku MSME. The decision variables in this research are the optimal raw material purchasing quantity and the optimal inventory cycle length. The objective of this study is to develop a multi-item perishable inventory model that considers probabilistic demand, uncertainty in raw material availability, and transportation capacity constraints in order to minimize total inventory cost.

Based on the model analysis, the optimal cycle length obtained is 9 days. The purchasing quantities in this study are dynamic and vary across periods for each item. The total inventory cost during the observation period is Rp26,580,434.64, while the total inventory cost under the company's current policy reaches Rp28,374,029.57. The proposed model is able to provide cost savings of Rp1,793,594.93 or equivalent to 6.3213%. Sensitivity analysis results indicate that the starting time of stock-out occurrence is the most influential parameter affecting total inventory cost, while the product deterioration rate and customer sensitivity to waiting time have relatively smaller effects.

Keywords: *EOQ, Perishable multi-item, Probabilistic demand, Raw material availability uncertainty, Transportation capacity constraint*