ABSTRACT

This study successfully developed a mathematical model of integrated inventory between single vendors and multi buyers in a two-echelon supply chain system in the hand-written batik industry. This research aims to minimise the total cost of combined inventory in the hand-written batik industry (vendors) and hand-written batik retailers (buyers), the model developed comes from the basic model of Wangsa & Wee (2017) combined with the basic model of Sarkar & Giri (2020) and Ouyang et al (2007). This modified model considers problems related to imperfect quality or defective products produced by the hand-written batik industry (vendors) so that rework is carried out so that hand-written batik products can be sold and cause rework costs and costs to improve quality. In addition, this mathematical inventory model also considers problems related to the long lead time for ordering hand-written batik where retailers can request an accelerated lead time to vendors for a fee of a certain amount. This research uses the Joint Inventory Management (JIM) inventory strategy by involving coordination and collaboration between vendors and buyers in determining inventory-related decisions. The search for optimal solutions is carried out through a quantification process in MATLAB software using the Genetic Algorithm method. The output obtained is in the form of eleven decision variables, namely the number of order lots from each retailer BKR, MGB, and FRB, the length of order leadtime for each retailer, the number of shipments in one production cycle and the probability of out of control. Then, a comparative analysis is carried out on real conditions with conditions using a modified or proposed model. The results obtained show that this research resulted in savings in BKI of 75.67%, BKR of 40.09%, MGB of 2.54%, FRB of 29.37%. So that the savings obtained in the total combined cost of 59.4% compared to the real conditions. In addition, a sensitivity analysis of the demand parameters and logistics costs was carried out and the results obtained showed that the demand parameters had a higher level of sensitivity when compared to logistics costs. At the end of the study, managerial implications were made to change the existing conditions to the proposed conditions.

Keyword: vendor, buyers, defect, lead time, integration, safety factor, echelon