ABSTRACT

PT ABC is a start-up company with a community based social commerce concept that provides an online shopping platform with a wide selection of daily necessities. One of the product categories offered by PT ABC is fast-moving consumer goods (FMCG). Currently, the decision to reorder and the number of product orders at PT ABC is only determined based on the experience of the decision maker without considering other cost factors that can affect the total inventory cost. In addition, the absence of product classification and demand forecasting cause all products to have the same priority, as well as the numbers of inventory exceed the demands. These conditions cause problems in inventory management, specifically the high total inventory cost.

Based on these problems, in this final project, an inventory policy design for FMCG products was carried out to find the optimal number of orders and reorder points to minimize the total inventory cost. In addition, the decision support system was designed to assist the decision maker in calculating inventory policy based on the results of the proposed design. The design process began with the classification of inventory items using ABC analysis so that obtained products in category A would be the focus of this final project. The process was continued by forecasting the demand data to calculate the estimated demands in the next period using the simple exponential smoothing and multiplicative decomposition method by considering the mean squared error (MSE), mean absolute deviation (MAD), and mean absolute percentage error (MAPE) value. After that, a normality test was carried out using the Shapiro-Wilk test on the demand data for category A products. Then, the inventory policy was calculated using the continuous review (r, Q) method with Hadley-Within iteration. Sensitivity analysis was carried out on the optimal solution from the design by considering the parameters, including demand, product purchase price, ordering cost, holding cost, and shortage cost.

The result of inventory classification was 42 products in category A with a cost contribution of 80%. Demand data in category A was uncertain because the standard deviation value of demand was not equal to zero and followed a normal distribution pattern (probabilistic demand). The forecast demand average of category A products for the next period increased 64% from the current period's

demand. Out of the 42 product SKUs, six of them experienced a decrease in the total demand. The average degradation reached 37%. While the rest, 36 product SKUs, raised in the total demand with an average increment reached 81%. Then, the total inventory cost using the continuous review method (r, Q) dropped to Rp2,196,405,319 or saved 11% of the total existing cost. Meanwhile, the total inventory cost for the next period using the same method was estimated at around Rp3,611,317,007, or an escalation of 64% from the current total proposed cost. After a sensitivity analysis has been carried out, the optimal solution was sensitive to changes by the demand and product's purchase price parameters. Based on the results of the design, the decision support system was designed using Microsoft Excel-VBA. The decision support system can display the results of the inventory policy in the form of the optimal number of orders, the optimal reorder point, and the total inventory cost and its cost components.

Based on the result of the proposed inventory policy design using the continuous review method (r, Q) it can be concluded that the solution offered in this final project can help PT ABC to minimize the total inventory cost from the previous condition and the decision support system can be used as a tool in calculating next inventory policy.

Key words: FMCG, inventory policy, continuous review, forecasting, inventory classification, decision support system