

ABSTRACT

UMKM XYZ is a business in the field of artisan bakery that faces challenges in meeting the needs of flour raw materials as the main raw material for making its products, with a level of supply uncertainty reaching 3.25% of the total need. This problem results in not achieving production targets and the risk of decreasing product quality credibility. To overcome this problem, this study designed a Supplier selection and order allocation system using the Analytical Hierarchy Process (AHP), Simple Additive Weighting (SAW), and Multi-Objective Linear Programming (MOLP) methods. The purpose of this research is to reduce the percentage of unfulfilled wheat flour at UMKM XYZ through order allocation planning based on the results of Supplier performance evaluation. The AHP method is used to determine the weight of Supplier evaluation criteria, the SAW method to rank Suppliers based on the weight of each Supplier, and MOLP to optimize order allocation based on four objective functions, namely minimization of delay time, minimization of quantity shortage, minimization of rejected products, and minimization of unmet demand. The design results show that iteration Z2 produces the most minimum Output, namely the system is able to reduce the delivery delay time from 8 days to 2 days, reduce the quantity shortage to 0.5 kg, reduce the number of rejected products from 25kg to 8 kg, and reduce the unmet demand rate from 3.25% to 1%. This SSAO system is proven to improve the efficiency of raw material procurement and support the sustainability of the production process of UMKM XYZ in the agroindustry value chain.

Keywords: *Supplier, Order Allocation, Analytical Hierarchy Process (AHP), Simple Additive Weighting (SAW), Multi-Objective Linear Programming (MOLP).*