Jareewat Ruangsri 2019: Classification and Prediction Models of Mercury Residue in Tuna of Material Purchasing and Material Planning. Master of Science (Agro-Industry Technology), Major Field: Agro-Industrial Technology Management, Department of Agro-Industrial Technology. Thesis Advisor: Assistant Professor Ravipim Chaveesuk, Ph.D. 110 pages.

This research identified important factors influencing the decision to pass or fail the tuna material receiving based on the Mercury residue purchasing criteria by building classification models to represent the relationship between independent variables of receiving month, tuna size, tuna origin, tuna specie and supplier and the pass or fail result as a dependent variable. Discriminant analysis, decision tree analysis, binary logistic regression, Backpropagation Neural Network (BPN) and Radial Basis Function Network (RBFN) were compared. Then, Mercury residue prediction models were developed based on these keys factors identified. The prediction models under study included multiple regression, BPN and RBFN. The prediction model may be used for determination of tuna material planning. Results on classification models indicated that 74-13-2 BPN with learning rate of 0.6 and momentum of 0.6 possessed highest correct classification rate of 77.5% and 78.1% for training and validating data sets, respectively. The key factors identified by this model were tuna origin, size, specie and supplier. Based on these key factors, the most accurate prediction model was 62-70-1 RBFN employing learning rate of 0.6 and momentum of 0.6 with mean absolute error (MAE) in training and validating data sets of 0.45 ppm and 0.31 ppm, respectively. However, this accuracy is unacceptable for industrial use, therefore, the classification model was used for determination of buying decision by the Purchasing department and for tuna planning by the Planning department. In order to implement this system, operators in the Purchasing department must be trained on using the BPN classification model. The classification system must be validated with the laboratory results until the accuracy are high and acceptable. Furthermore, retraining 74-13-2 BPN with more data must be scheduled to update and increase the correct classification rate.

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