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Prediction of Fuel Costs of Various Farm Machinery in Oil Palm Plantation Operations

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Fuel is a key element to operate the farm machinery in oil palm plantations. Efficient fuel usage is an important aspect that needs attention in the effort to reduce production costs in oil palm plantations. Currently, estimation of fuel costs is made by using formulas that were developed based on the data of farm machinery operation in the USA farming system, which differs from the farming system in oil palm plantations in Malaysia. This study was conducted to develop a predictive fuel cost model for various operations in oil palm plantation. This study emphasises on the development of predictive fuel cost model for in-field fresh fruit bunch (FFB) evacuation, mainline transport, spraying and manuring operations. Factors which affect fuel cost directly were also mathematically determined to investigate their relationship. Sensitivity analysis of the predictive fuel cost model was also done. The data collection in this study was obtained through field observation, interviews and secondary data extraction from the oil palm estates management records. Pearson correlation analysis and multi-regression analysis were used to analyse the collected data. The Marginal Physical Product (MPP) method was used to determine the sensitivity of the models. This study has successfully developed useable predictive fuel cost models for in-field FFB evacuation, mainline transport, spraying and manuring with regression (R^2) value of 0.945, 0.973, 0.676 and 0.870 respectively. The sensitivity analysis of each of the four predictive fuel cost models showed that all the variables correlated and were significant to the respective fuel cost will have positive impact on the fuel cost.

Keywords : Farm machinery, mechanisation, fuel costs, oil palm plantation operations, mathematical modelling.

