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The development of a discrete event simulation (DES) model for evaluating the mechanized equipment in the Malaysia palm oil industry

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Abstract

The palm oil industry forms the backbone of the Malaysian agricultural economy and is indexed as one of the National Key Economic Areas (NKEAs). Despite the rapid demand for palm oil, the labor shortage caused by the Covid-19 pandemic has reduced harvest activity since the dependability on human labor is still high. Based on this scenario, the way forward to resolve the issue is through the implementation of mechanized equipment to assist plantation activities. However, the output rate based on the implementation of mechanized equipment in the Malaysian palm oil industry is still unclear. In this regard, this paper aims to develop a simulation model that mimics the operation of the mechanized equipment in the palm oil mill using a discrete event simulation (DES) approach. The related mechanized equipment has been considered in the simulation model to resemble the palm oil mill operation, namely clarification, extraction, sterilization, and stripping stations. As a result, it is found that the sterilization process contributes to the longest waiting time (122.89 seconds) and the highest number of waiting (3.04 tons). In contrast, stripping stations turn the lowest percentage of resource utilization. By improving the utilization of identified mechanized equipment, the dependability on human labor can be reduced gradually. Consequently, it will increase the harvest output known as Fresh Fruit Branches (FFB) yield and crude palm oil (CPO) production. © 2024 Author(s).

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