TECHNO-ECONOMIC ANALYSIS OF PLTS ON THE MAGDRY BSF (SMART DRYER MAGGOT BLACK SOLDIER FLY)

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ABSTRACT

Black Soldier Fly (BSF) larvae show potential as alternative livestock feed, boasting protein content of 40–50% and fat content of 29–32%; however, conventional drying methods using LPG stoves are considered inefficient and costly. This study analyzes the techno-economic feasibility of a solar photovoltaic (PV) system integrated into an IoT-based MAGDRY BSF dryer, utilizing a 550 Wp solar panel, a 1 kW inverter, and a 12V 100Ah battery. The solar PV system entails an initial investment cost of IDR 11,665,808.07, a total Life Cycle Cost (LCC) of IDR 18,619,826.87, and a Levelized Cost of Energy (LCoE) of IDR 1,657.97/kWh. Investment feasibility analysis yielded a Benefit-Cost Ratio (BCR) of 1.711 with a Discounted Payback Period (DPP) of 18 years and 1 month under the LWBP (Off-Peak) tariff scenario, and a BCR of 1.963 with a DPP of 14 years and 2 months under the LCoE-based scenario; consequently, the system is deemed a viable investment. Production analysis indicates that the MAGDRY BSF unit produces 0.4 kg of dried larvae from 1 kg of fresh larvae in approximately 6 hours per cycle, generating a net profit of IDR 20,845.75 per cycle. The investment in dried larvae production yields a Net Present Value (NPV) of IDR 139,514,062 and a DPP of approximately 1 year and 10 months, indicating high feasibility. Furthermore, the energy cost for drying using the solar PV system is IDR 3,954.25 per cycle significantly lower than the IDR 22,000 per cycle cost associated with LPG resulting in energy cost savings of IDR 18,045.75, or approximately 82.02%.

Keywords: *Investment Feasibility, MAGDRY BSF, Solar Power System, Techno-Economic*