ABSTRAK

Industri kelapa sawit selain sebagai sumber devisa negara juga berkontribusi terhadap penurunan mutu lingkungan akibat besarnya volume penggunaan sumber daya serta keseimbangan area sekitar perkebunan dan sepanjang rantai pasok pengolahan minyak sawit. Penelitian dilaksanakan di lima perusahaan sawit yang berlokasi di Banten, Kalimantan Tengah, Kalimantan Timur, dan Sumatera Utara yang memiliki kapasitas terpasang serta teknologi yang sama. Integrasi penilaian keberlanjutan (*sustainable assessment*) melalui penggunaan *material flow cost accounting* dan *life cycle assessment* difokuskan untuk pengurangan *losses* dan *oil recovery*. Upaya ini memerlukan transparansi aliran sumber daya untuk pemantauan dan pengelolaannya. Akselerasi kegiatan melalui *workplace assessment* dilaksanakan untuk lebih melibatkan industri kelapa sawit terhadap peningkatan tanggung jawab, efisiensi, dan dampak ekonomi secara langsung. Sedangkan adaptasi skenario untuk peningkatan produktivitas melalui pemulihan minyak (*oil recovery*) sangat memerlukan parameter pendukung untuk adaptasinya. Penelitian ini bertujuan untuk mengimplementasikan penilaian berkelanjutan melalui analisis aliran material dan energi, pendekatan biaya produksi, penerapan *material flow cost accounting* (ISO 14051), *workplace assessment,* dan *cradle to gate* penilaian daur hidup (ISO 14040-14044) agar penggunaan sumber daya, aliran pembiayaan serta proses, dan dampak dari aktivitas lebih tertelusur. Estimasi nilai 25,766% produk dengan 57,3721% pembiayaan dan limbah 74,234% dengan 42,6278% pembiayaan menunjukkan potensi perbaikan yang adaptif untuk diterapkan sesuai dengan kemampuan masing-masing perusahaan sawit. Sedangkan biaya *oil recovery* sisa pada biomassa dan produk antara berkisar 0,24 – 1,06 % dengan kenaikan biaya energi dan biaya energi sebesar 23,45 – 64,49 dapat menjadi dasar penguatan komitmen dari pelaksana kegiatan dan manajemen pabrik kelapa sawit terkait untuk berinovasi (SDG 9), kepatuhan dan tanggung jawab produksi dan konsumsi sesuai regulasi (SDG 12), peningkatan reputasi, efisiensi operasional, pengurangan biaya, serta peningkatan inovasi dan mitigasi dampak untuk penguatan rantai pasok (SDG 13). Penilaian keberlanjutan dengan melibatkan studi konteks sosial dan kultural, dinamika pasar, kebijakan perusahaan, keterbatasan model, dan ketidakpastian data dalam lingkungan diharapkan menjadi memberikan kontribusi penguatan industri sawit Indonesia berkelanjutan.

Kata kunci: efisiensi, industri kelapa sawit berkelanjutan, *material flow cost accounting*, penilaian daur hidup, transparansi

ABSTRACT

Apart from being a source of foreign exchange, the palm oil industry also contributes to environmental degradation due to the large volume of resource use and the balance of the area around the plantation and along the palm oil processing supply chain. The study was conducted in five palm oil companies located in Banten, Central Kalimantan, East Kalimantan, and North Sumatra that have the same installed capacity and technology. The integration of sustainable assessment through the use of material flow cost accounting and life cycle assessment focused on reducing losses and oil recovery. This effort requires transparency of resource flows for monitoring and management. Acceleration of activities through workplace assessment is implemented to further engage the palm oil industry towards increased responsibility, efficiency, and direct economic impact. Meanwhile, scenario adaptation to increase productivity through oil recovery requires supporting parameters for adaptation. This study aims to implement sustainable assessment through material and energy flow analysis, production cost approach, application of material flow cost accounting (ISO 14051), workplace assessment, and cradle to gate life cycle assessment (ISO 14040-14044) so that the use of resources, financial flows and processes, and impacts of activities are more traceable. The estimated values of 25.766% product with 57.3721% financing and 74.234% waste with 42.6278% financing show the potential for adaptive improvements to be implemented according to the capabilities of each palm oil company. While the cost of residual oil recovery in biomass and products ranging from 0.24 - 1.06% with an increase in energy costs and energy costs of 23.45 - 64.49 can be the basis for strengthening the commitment of activity implementers and management of related palm oil mills to innovate (SDG 9), compliance and responsibility for production and consumption in accordance with regulations (SDG 12), reputation enhancement, operational efficiency, cost reduction, and increased innovation and impact mitigation for supply chain strengthening (SDG 13). Sustainability assessments involving social and cultural context studies, market dynamics, company policies, model limitations, and data uncertainty in the environment are expected to contribute to strengthening Indonesia's sustainable palm oil industry.

Keywords: efficiency, life cycle assessment, material flow cost accounting, sustainable palm oil industry, transparency