

**KAJIAN PEMBOROSAN PADA PROSES PRODUKSI *PELLET*
DENGAN MEMPERTIMBANGKAN ASPEK
KEBERLANJUTAN
(Studi Kasus: PT. XYZ)**

*Diajukan Sebagai Salah Satu Syarat Untuk Menyelesaikan Program Sarjana
Pada Departemen Teknik Industri Fakultas Teknik Universitas Andalas*

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ABSTRAK

PT XYZ memproduksi pakan ternak jenis mash, crumble, dan pellet, dengan pellet sebagai produk dominan. Pada proses produksi pellet masih ditemukan aktivitas pemborosan berupa kerusakan karung dan repack, gerakan operator yang tidak diperlukan, serta waktu tunggu pada pemindahan material yang memengaruhi efisiensi proses dan kinerja keberlanjutan. Penelitian ini bertujuan mengidentifikasi pemborosan dominan dan akar penyebabnya, mengukur kinerja keberlanjutan manufaktur, serta menyusun usulan perbaikan berbasis Sustainable Lean Manufacturing.

Penelitian menggunakan Value Stream Mapping (VSM) untuk memetakan kondisi proses, Waste Assessment Model (WAM) yang terdiri atas Waste Relationship Matrix (WRM) dan Waste Assessment Questionnaire (WAQ) untuk menentukan waste dominan, serta Value Stream Analysis Tools (VALSAT) dengan Process Activity Mapping (PAM) untuk menganalisis aktivitas. Akar penyebab dianalisis menggunakan fishbone diagram dan Failure Mode and Effects Analysis (FMEA), sedangkan kinerja keberlanjutan diukur menggunakan Manufacturing Sustainability Index (MSI) dengan validasi Content Validity Index (CVI) dan pembobotan Analytical Hierarchy Process (AHP).

Hasil penelitian menunjukkan waste dominan berupa defect 19,39%, motion 17,53%, dan waiting 16,06%. FMEA menghasilkan 17 penyebab prioritas dengan RPN di atas critical value 212,85. Total waktu proses berkurang dari 38.814,60 detik menjadi 30.281,71 detik dan PCE meningkat dari 47,30% menjadi 60,63%. Current MSI sebesar 78,88%, dengan prioritas perbaikan pada waktu, pelatihan kerja, dan kualitas. Usulan perbaikan meliputi SOP handling karung dan penurunan pallet, form monitoring repack, checklist preventive maintenance, serta Standard Work Instruction. Berdasarkan perhitungan future, MSI meningkat menjadi 86,82%.

Kata Kunci: *Sustainable Lean Manufacturing, Waste, Waste Assessment Model, Process Activity Mapping, Manufacturing Sustainability Index.*

ABSTRACT

PT XYZ produces *mash*, *crumble*, and *pellet* animal feed, with *pellet* as the dominant product. Waste activities are still found in the *pellet* production process, including damaged sacks and repacking, unnecessary operator movements, and waiting during material transfer, affecting process efficiency and sustainability performance. This study aims to identify dominant wastes and their root causes, measure manufacturing sustainability performance, and develop improvement recommendations based on *Sustainable Lean Manufacturing*.

Value Stream Mapping (VSM) was used to map the production process, while the *Waste Assessment Model* (WAM), consisting of the *Waste Relationship Matrix* (WRM) and *Waste Assessment Questionnaire* (WAQ), was applied to identify dominant wastes. *Value Stream Analysis Tools* (VALSAT) with *Process Activity Mapping* (PAM) were used to analyze production activities. Root causes were evaluated using a fishbone diagram and *Failure Mode and Effects Analysis* (FMEA). Sustainability performance was measured using the *Manufacturing Sustainability Index* (MSI), with *Content Validity Index* (CVI) validation and *Analytical Hierarchy Process* (AHP) weighting.

The results identified *defect* (19.39%), *motion* (17.53%), and *waiting* (16.06%) as the dominant wastes. FMEA identified 17 priority causes with RPN values above the critical value of 212.85. Total processing time decreased from 38,814.60 seconds to 30,281.71 seconds, while PCE increased from 47.30% to 60.63%. The current MSI was 78.88%, with time, employee training, and quality as improvement priorities. Proposed improvements included sack-handling and pallet-lowering SOPs, a repack monitoring form, preventive-maintenance checklists, and *Standard Work Instructions*. The calculated future MSI increased to 86.82%.

Keywords: *Sustainable Lean Manufacturing, Waste, Waste Assessment Model, Process Activity Mapping, Manufacturing Sustainability Index.*