

**APPLICATION OF LIFE CYCLE ASSESSMENT
IN BALADO CASSAVA CHIPS INDUSTRY (CASE STUDY:
KRIPIK BALADO CHRISTINE HAKIM BUSINESS)**

UNDERGRADUATE THESIS

As one of the requirements for completing
The Bachelor's Program
In the Department of Environmental Engineering
Faculty of Engineering Universitas Andalas



**DEPARTMENT OF ENVIRONMENTAL ENGINEERING
FACULTY OF ENGINEERING - UNIVERSITAS ANDALAS**

PADANG

2026

ABSTRACT

The production of balado cassava chips generates environmental impacts due to energy use and material inputs throughout the product life cycle. This study aims to evaluate the environmental impacts associated with producing 250 g of balado cassava chips using the Life Cycle Assessment (LCA) method with a cradle-to-grave approach. The system boundary covers raw material cultivation, processing, packaging, distribution, consumption, and end-of-life waste management. The analysis was conducted using SimaPro 9.5 software with the CML-IA Baseline method in accordance with ISO 14040:2016. The impact assessment results show characterization values of 0.539 kg CO₂ eq for Global Warming Potential (GWP100a), 0.00404 kg PO₄ eq for eutrophication, and 0.004 kg SO₂ eq for acidification per functional unit. The frying stage was identified as the main environmental hotspot, primarily due to intensive kerosene combustion required to maintain high and stable cooking temperatures. This process results in significant emissions of carbon dioxide, nitrogen oxides, and other combustion related pollutants that contribute to climate change, nutrient enrichment, and atmospheric acidification. Fertilizer use during cassava cultivation also contributes to eutrophication and acidification through nutrient runoff and upstream emissions. Improvement scenarios focusing on partial energy efficiency and substitution in the frying process, along with reduced phosphate fertilizer application, achieved impact reductions of up to 7% for GWP, 3% for eutrophication, and 8% for acidification. These findings highlight that improving energy efficiency and optimizing input use are essential strategies for reducing environmental impacts and enhancing sustainability performance in snack industry businesses.

Keywords: balado cassava chips, CML-IA Baseline, cradle-to-grave, environmental impact, Life Cycle Assessment