CHAPTER V
CONCLUSION AND SUGGESTION

5.1 Conclusion

Based on the LCA conducted on the production of 250 g *balado* cassava chips at Kripik Balado Christine Hakim Business using a cradle-to-grave approach, the following conclusions can be drawn:

1. The product system of *balado* cassava chips was successfully identified, covering all stages from cassava cultivation, raw material and seasoning transportation, washing, peeling and slicing, frying, seasoning, packaging, distribution to outlets, and end-of-life management of packaging waste. This confirms that the entire life cycle of the product was comprehensively represented in the assessment.
2. A complete life cycle inventory (LCI) was compiled, including the use of raw materials (cassava, cooking oil, seasoning ingredients, and water), energy inputs (electricity and kerosene), transportation fuels, and the associated emissions. The main emissions identified throughout the system were carbon dioxide (CO_2), nitrogen oxides (NO_x), sulfur dioxide (SO_2), nitrate, and ammonia, primarily originating from fuel combustion and fertilizer application.
3. The impact assessment conducted using SimaPro 9.5 and the CML-IA Baseline method revealed that the dominant environmental impacts occur in the categories of GWP, AP, and EP. The frying process was identified as the main environmental hotspot contributing to GWP and AP due to intensive kerosene consumption, while cassava cultivation significantly influenced EP as a result of fertilizer use and upstream energy inputs.
4. Based on the interpretation and improvement analysis, energy use in the frying and seasoning stages and fertilizer application during cassava cultivation were identified as the most influential parameters affecting overall environmental performance. Therefore, targeted improvement strategies focusing on energy efficiency and optimized fertilizer management have strong potential to reduce

environmental impacts and enhance the environmental sustainability of *balado* cassava chips production.

5.2 Suggestion

Based on the findings and limitations of this study, several recommendations can be proposed for future work and practical implementation:

1. Future research is encouraged to collect more detailed primary data directly from the production facility, particularly related to energy consumption, production capacity, and operational parameters. Improved data availability would reduce reliance on secondary sources and enhance the accuracy and reliability of LCA results.
2. Producers are recommended to improve energy efficiency in the frying and seasoning processes through better heat management, equipment optimization, or partial substitution of kerosene with cleaner or renewable energy sources. These measures can significantly reduce fuel-related emissions and overall environmental impacts.
3. For future research, it is recommended to expand the scope of analysis by applying a Life Cycle Sustainability Assessment (LCSA) framework that integrates more social dimensions, providing a more comprehensive evaluation of sustainability performance.