CHAPTER V
CONCLUSION

5.1 Conclusion

The environmental impact analysis of yellow noodle production shows that the highest impact category is Abiotic Depletion (1025.52 MJ), followed by Global Warming (158.88 kg CO_2 eq), Water Use (239.91 L), Solid Waste (45.21 kg), and Photochemical Oxidation (0.06 kg C_2H_4 eq). These impacts indicate that yellow noodle production still imposes a significant environmental burden, particularly in terms of non-renewable energy consumption and greenhouse gas emissions. Therefore, mitigation efforts are needed to reduce the main environmental impacts and enhance the sustainability of the production process.

These major impacts are largely caused by the use of used lubricating oil as fuel and high water consumption during production. The steaming process is identified as the main hotspot, contributing 538.03 MJ to abiotic depletion, 73.18 kg CO_2 eq to global warming, and consuming 201.89 liters of water. This indicates that even though used oil is considered waste, its combustion still leads to significant resource use and emissions.

The analysis shows that if environmental impact is the main priority, LPG is the best option as it produces the lowest annual emissions (79,396.98 kg CO_2 eq), although its cost is relatively high (IDR 205 million/year). If cost efficiency is the sole consideration, used oil is the most economical option, with an annual cost of only IDR 34 million, but it results in the highest emissions (136,315.84 kg CO_2 eq). Biodiesel becomes the most balanced alternative as it has a relatively low cost (IDR 99 million/year), moderate emissions (95,929.78 kg CO_2 eq), and the best environmental-cost efficiency ratio (9.64×10^{-4} kg CO_2 eq/IDR). Meanwhile, briquettes are the worst choice, as they generate high emissions (106,886.44 kg CO_2 eq) and the highest cost (IDR 235 million/year), making them inefficient both environmentally and economically.

In terms of production productivity, switching to LPG was chosen as it increases productivity by 12.06%. The investment feasibility analysis using the payback period method shows that replacing used oil with LPG provides a payback in just 1.22 months, indicating low financial risk and a high potential for rapid return on investment.

5.2 Suggestion

1. Due to limited data resources, it is recommended that future research conducts a Life Cycle Assessment (LCA) by analyzing all processes involved within the company.
2. Future researchers are also encouraged to assess the Life Cycle Assessment across the entire product lifecycle, from product use to its end-of-life phase, in order to evaluate the environmental impact comprehensively.

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