



A COMPARISON BETWEEN A NOVEL INDIRECT SOLAR DRYER AND CONVENTIONAL FUEL DRYERS BASED ON THE FINANCIAL ANALYSIS AND CO₂ EMISSIONS

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ABSTRACT – A novel indirect solar dryer (NISD) was assessed on the financial analysis and carbon dioxide (CO₂) emissions in drying of mango halves and fermented cacao beans. Comparison was made between the NISD and conventional fuel dryers (CFDs) using electric, gas fired, and biomass heaters having the same shape and dimensions. Life Cycle Cost, Life Cycle Savings and Discounted Payback Period are the financial indicators and CO₂ emission as one of the many environmental indicators. The financial and CO₂ emissions analyses were based on the amount of heat energy required to dry 216 kgs of mango halves and 900 kgs of fermented cacao beans yearly using the various dryers. The results showed that the NISD has the least annual cost with the largest savings in drying both products and the initial investment can be recovered in less than a year when used to dry fermented cacao beans. CO₂ emissions from the NISD with values of 0.0099 and 0.0034 kgCO₂/kg of wet mango halves and fermented cacao beans, respectively, was found to be insignificant as compared with the CFDs.

Keywords: CO₂ emissions, conventional fuel dryer, financial analysis, solar dryer



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