# TECHNO-ECONOMIC ANALYSIS OF POSTHARVEST PROCESSING STRATEGIES FOR MIXED-MATURITY ARABICA COFFEE CHERRIES

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Bogor, June 2026

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# ABSTRACT

KAYLA ANDHITA AZZAHRA. Techno-Economic Analysis of Postharvest Processing Strategies for Mixed-Maturity Arabica Coffee Cherries. Supervised by SAPTA RAHARJA, TITI CANDRA SUNARTI.

Mixed-maturity coffee cherries from strip harvesting provide operational efficiency but may limit coffee quality and economic value. This investigation evaluated postharvest processing strategies for mixed-maturity Arabica coffee through an integrated techno-economic approach. Natural processing, submerged self-induced anaerobic fermentation (SIAF), and solid-state SIAF were evaluated through iterative process development. The natural-process baseline produced a cupping score of 78.42, while solid-state SIAF increased the scores to 84.50 and 86.42 for spontaneous and inoculated treatments, respectively, achieving specialty-grade quality without fermentation-water addition. Both solid-state alternatives were subsequently designed at 100 kg cherries/batch. The projected selected-green-bean outputs were 17.29 kg/batch for spontaneous and 19.43 kg/batch for inoculated SIAF. Estimated production costs were Rp104,051/kg and Rp101,329/kg, with proposed selling prices of Rp190,000/kg and Rp195,000/kg, respectively. Both alternatives generated positive gross profit across the evaluated sensitivity scenarios. Spontaneous SIAF provided the simpler configuration without starter culture, while inoculated SIAF achieved the highest numerical sensory score and estimated gross profit. Overall, solid-state SIAF showed potential for increasing the quality and economic value of mixed-maturity Arabica coffee.

Keywords: Arabica coffee, mixed-maturity cherries, self-induced anaerobic fermentation, techno-economic analysis, value addition

# *ABSTRAK*

KAYLA ANDHITA AZZAHRA. Techno-Economic Analysis of Postharvest Processing Strategies for Mixed-Maturity Arabica Coffee Cherries. Dibimbing oleh SAPTA RAHARJA, TITI CANDRA SUNARTI.

*Buah kopi dengan tingkat kematangan campuran hasil pemanenan serentak memberikan efisiensi operasional, tetapi dapat membatasi mutu dan nilai ekonomi kopi. Penelitian ini mengevaluasi strategi pengolahan pascapanen kopi Arabika dengan tingkat kematangan campuran melalui pendekatan tekno-ekonomi terintegrasi. Pengolahan natural*, self-induced anaerobic fermentation (SIAF) *terendam, dan SIAF padat dievaluasi melalui pengembangan proses secara iteratif. Pengolahan natural menghasilkan skor cupping 78,42, sedangkan SIAF padat meningkatkan skor menjadi 84,50 dan 86,42 masing-masing untuk perlakuan spontan dan terinokulasi, sehingga mencapai mutu specialty tanpa penambahan air fermentasi. Kedua alternatif SIAF padat kemudian dirancang pada kapasitas 100 kg buah kopi/batch. Produksi biji kopi hijau terseleksi diproyeksikan sebesar 17,29 kg/batch untuk SIAF spontan dan 19,43 kg/batch untuk SIAF terinokulasi. Biaya produksi diperkirakan sebesar Rp104.051/kg dan Rp101.329/kg, dengan harga jual usulan masing-masing Rp190.000/kg dan Rp195.000/kg. Kedua alternatif menghasilkan laba kotor positif pada seluruh skenario sensitivitas yang dievaluasi. SIAF spontan menawarkan konfigurasi yang lebih sederhana tanpa kultur starter, sedangkan SIAF terinokulasi menghasilkan skor sensori numerik dan estimasi laba kotor tertinggi. Secara keseluruhan, SIAF padat menunjukkan potensi untuk meningkatkan mutu dan nilai ekonomi kopi Arabika dengan tingkat kematangan campuran.*

*Kata kunci: Analisis tekno-ekonomi, fermentasi anaerobik terinduksi mandiri, kopi Arabika, nilai tambah, tingkat kematangan campuran*

# TECHNO-ECONOMIC ANALYSIS OF POSTHARVEST PROCESSING STRATEGIES FOR MIXED-MATURITY ARABICA COFFEE CHERRIES

**KAYLA ANDHITA AZZAHRA**

Undergraduate Final Project
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**AGROINDUSTRIAL ENGINEERING STUDY PROGRAM**
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The author recognizes that this thesis is not without limitations. Nevertheless, it is hoped that the findings presented in this thesis can contribute to the development of postharvest processing strategies for mixed-maturity Arabica coffee and provide useful information for further investigations and practical applications. May this thesis be beneficial to those who need it and contribute to the advancement of knowledge in agro-industrial engineering and coffee processing.

Bogor, July 2026

*Kayla Andhita Azzahra*

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