FINANCIAL ANALYSIS OF IMPROVED METHODS TO PREVENT SUGAR BLOOM FORMATION FOR DRIED BANANA PRODUCTS

NAUFAL FAADHIL HANIF

DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY
FACULTY OF AGRICULTURAL TECHNOLOGY AND ENGINEERING
IPB UNIVERSITY BOGOR
2025

STATEMENT REGARDING UNDERGRADUATE FINAL PROJECT AND INFORMATION SOURCES AND COPYRIGHT TRANSFER

I declare that the undergraduate final project entitled "Financial Analysis of Improved Methods to Prevent Sugar Bloom Formation for Dried Banana Products" is my work under the direction of my supervisors. This undergraduate final project has not been submitted in any form to any university. All sources of information, whether originating or quoted from published or unpublished works by other authors, have been mentioned in the text and listed in the references at the end of this undergraduate final project.
Furthermore, I now assign the copyright of my written work to IPB University.

Bogor, July 2025

Naufal Faadhil Hanif
F3401211013

ABSTRACT

NAUFAL FAADHIL HANIF. Financial Analysis of Improved Methods to Prevent Sugar Bloom Formation for Dried Banana Products. Supervised by ELISA ANGGRAENI and ENDANG WARSIKI.

Hillkoff is a well-established agroindustry located in Chiang Mai, Thailand, specializing in innovative agricultural products, including its dried banana snacks. These bananas are processed using sustainable techniques that preserve flavor, nutrients, and extend shelf life, while offering various unique flavors such as espresso, cappuccino, chocolate, matcha, and pumpkin alongside the original version. The product is marketed as a premium healthy snack and is widely distributed both domestically and internationally. However, one of the persistent challenges faced in production is sugar bloom, a crystallization of sugar that appears on the surface of the banana. While it does not affect taste or safety, the visual appearance of sugar bloom is often mistaken by consumers as mold or spoilage, which lowers product acceptance and forces the company to either discard or repurpose affected products. This leads to increased costs and reduced profitability, making sugar bloom a critical financial concern for Hillkoff. This study evaluates the financial feasibility of two improvement methods aimed at minimizing sugar bloom in industrial production. Under existing conditions for 45 days stock, the cost of goods manufactured (COGM) is 15.07 ฿/Pcs, with a monthly profit of 17,183.56 ฿. The process improvement method, which involves the use of citric acid, reduces COGM by 9.29% to 13.67 ฿/Pcs and increases profit by 14.71% to 19,712.53 ฿/month, resulting in a net benefit of 2,528.97 ฿/month. Meanwhile, the post-process improvement method, which applies cold storage, lowers COGM by 14.27% to 12.92 ฿/Pcs and raises profit by 23.54% to 21,229.48 ฿/month, generating a higher net benefit of 4,045.92 ฿/month. Financial analysis shows both methods are feasible, as indicated by positive Net Present Value (NPV) and Benefit Cost Ratio (B/C), with viability maintained when sugar bloom occurrence stays below 26.35% for the process improvement and 27.03% for the post-process improvement.

Keywords: financial analysis, dried banana, improvement methods, sugar bloom

ABSTRAK

NAUFAL FAADHIL HANIF. Analisis Finansial pada Perbaikan Metode untuk Mencegah Formasi Kristal Gula pada Produk Pisang Kering. Dibimbing oleh ELISA ANGGRAENI dan ENDANG WARSIKI.

Hillkoff adalah perusahaan agroindustri berbasis di Chiang Mai, Thailand, yang berspesialisasi dalam produk pertanian inovatif, termasuk camilan pisang sale (dried banana). Produk pisang ini diproses menggunakan teknik berkelanjutan yang menjaga cita rasa, kandungan nutrisi, serta memperpanjang masa simpan, dengan berbagai varian rasa unik seperti espresso, cappuccino, cokelat, matcha, dan labu, selain varian original. Produk ini dipasarkan sebagai camilan sehat premium yang telah tersebar luas baik di pasar domestik maupun internasional. Namun, salah satu tantangan utama dalam proses produksinya adalah sugar bloom, yaitu kristalisasi gula yang muncul di permukaan pisang. Meskipun tidak memengaruhi rasa maupun keamanan produk, tampilan visual sugar bloom seringkali disalahartikan konsumen sebagai jamur atau tanda kerusakan, sehingga menurunkan kepercayaan dan daya tarik produk. Hal ini membuat perusahaan terpaksa membuang atau mengalihfungsikan produk yang terdampak, yang berujung pada peningkatan biaya dan penurunan profitabilitas. Oleh karena itu, sugar bloom menjadi permasalahan finansial yang penting untuk Hillkoff. Penelitian ini mengevaluasi kelayakan finansial dari dua metode perbaikan yang bertujuan untuk meminimalkan terjadinya sugar bloom pada produksi skala industri. Dalam kondisi eksisting untuk stok 45 hari, biaya pokok produksi (COGM) tercatat sebesar 15.07 ฿/Pcs, dengan profit bulanan sebesar 17,183.56 ฿. Metode perbaikan proses yang menggunakan penambahan 0.35% asam sitrat mampu menurunkan COGM sebesar 9.29% menjadi 13.67 ฿/Pcs dan meningkatkan profit sebesar 14.71% menjadi 19,712.53 ฿/bulan, dengan net benefit sebesar 2,528.97 ฿/bulan. Sementara itu, metode perbaikan pasca-proses yang melibatkan penyimpanan dingin menurunkan COGM sebesar 14.27% menjadi 12.92 ฿/Pcs dan meningkatkan profit sebesar 23.54% menjadi 21,229.48 ฿/bulan, menghasilkan net benefit yang lebih tinggi sebesar 4,045.92 ฿/bulan. Analisis finansial menunjukkan bahwa kedua metode tersebut layak diterapkan, ditunjukkan oleh nilai Net Present Value (NPV) dan Benefit Cost Ratio (B/C) yang positif, dengan kelayakan tetap terjaga selama kejadian sugar bloom berada di bawah 26.35% untuk metode perbaikan proses dan di bawah 27.03% untuk metode perbaikan pasca-proses.

Kata kunci: analisis finansial, pisang sale, perbaikan metode, kristalisasi gula

FINANCIAL ANALYSIS OF IMPROVED METHODS FOR DRIED BANANA PRODUCTION

NAUFAL FAADHIL HANIF

Undergraduate Final Project
One of the requirements for obtaining a Bachelor of Engineering Degree with Honours in Agro-Industrial Engineering Study Program

DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY FACULTY OF AGRICULTURAL TECHNOLOGY AND ENGINEERING
IPB UNIVERSITY BOGOR
2025

Team of Examiners in Undergraduate Final Project Examination:
1. Dr. Ir. Sugiarto, M.Si.
2. Dr. Ir. Mulyorini Rahayuningsih, M.Si.

Final Project Title : Financial Analysis of Improved Methods to Prevent Sugar Bloom Formation for Dried Banana Products

Name : Naufal Faadhil Hanif

NIM : F3401211013

Approved by

Supervisor 1:
Dr. Elisa Anggraeni, S.TP., M.Sc.

Supervisor 2:
Prof. Dr. Endang Warsiki, S.TP., M.Si.

Acknowledged by

Head of Department:
Prof. Dr. Ono Suparno, S.TP, M.T.
NIP. 197212031997021001

Date of Exam:
Monday, August 11th 2025

Date of Approval:
Thursday, August 21st 2025

PREFACE

The author extends sincere praise and gratitude to Allah Subhanahu wa Ta'ala for His abundant blessings, which have enabled the successful completion of this scientific work. The research, titled "Financial Analysis of Improved Methods to Prevent Sugar Bloom Formation for Dried Banana Products" was conducted from April 2025 to July 2025. The completion of this report was made possible through the support and contributions of many individuals, to whom the author is deeply grateful:

1. Ali Mustangin (Father), Titik Irawati (Mother), Shafira Nurfadhila (Elder Sister), Muhammad Faishal Hanif (Little Brother), Babo and Jiji (Beloved Furbabies), for their unwavering support throughout the author's life and academic journey.
2. Dr. Elisa Anggraeni, S.TP., M.Sc., as the academic advisor and final project supervisor, for her continuous guidance and encouragement throughout the completion of this report
3. Prof. Dr. Endang Warsiki, S.TP., M.Si, and Dr. Chananpat Rardniyom, B.Sc., M.S., as supervisors for the final project, for providing the opportunity and facilitating the author's research at Hillkoff Co., Ltd, Chiang Mai, Thailand. Their input and direction during the project were invaluable and greatly appreciated.
4. Naruemon Taksaudom, Noi Jumjee, Wiraphon Sisopha, Charinee Poonsuk, and the entire Hillkoff family, for their warm welcome, generous assistance, and accommodations throughout the author's stay in Thailand.
5. All lecturers, academic staff, Laboratory Technicians, Lab Assistants, and UPT Department TIN staff, who have supported the author throughout his studies at IPB University.
6. Manda Lavina Nathania, Muhammad Fauzan Al-Fahrizi, and Muhammad Ihza Nugraha Pratama as teammates in the PRODUTA group, for their cooperation and shared effort in completing this final project.
7. Edgar Azzano Aljudavi, Nabil Muzhaffar, Anastasia Fidella Carmelita, and Muhammad Irfan Fauzi, classmates from K3 TIN (sleepy Kaythree), who have been supportive companions throughout the author's university journey.
8. Seluruh teman TIN 58 (Tinvincible) who have shared many meaningful moments and experiences during the author's time in TIN.

May this scientific work serve as a valuable resource for academic development and contribute meaningfully to the advancement of knowledge.

Bogor, July 2025

Naufal Faadhil Hanif

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS