

**CLEANER PRODUCTION ASSESSMENT AT
CARM FOODS ENTERPRISES, INC.**

An Undergraduate Thesis
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfillment
of the requirements for the degree,
Bachelor of Science in Industrial Engineering

DANAREEN D. CORNEJO
HARRY D. EDNACOT JR.
May 2017



Republic of the Philippines
CAVITE STATE UNIVERSITY
Don Severino de las Alas Campus
Indang, Cavite
☎ (046) 4150-010 / (046) 4150-013 loc 206
www.cvsu.edu.ph

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

Department of Industrial Engineering and Technology

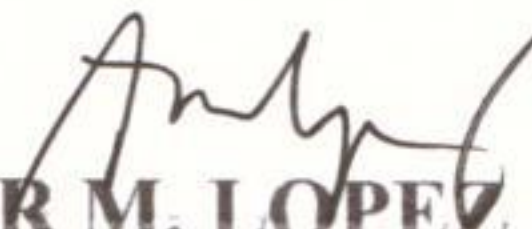
AUTHORS: **DANAREEN D. CORNEJO and HARRY D. EDNACOT JR.**

TITLE: **CLEANER PRODUCTION ASSESSMENT AT CARM FOODS ENTERPRISES INC.**


APPROVED:


GERRY M. CASTILLO
Adviser

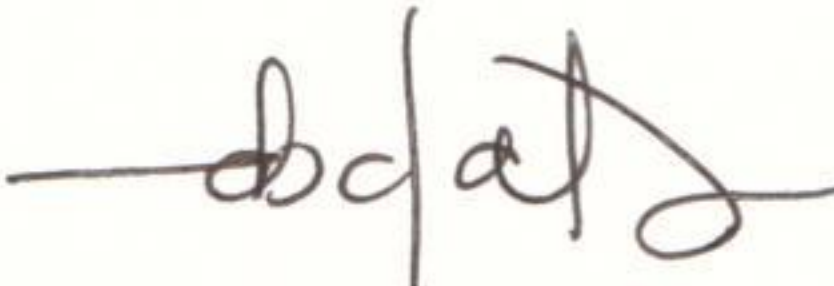
Date


AIVAR M. LOPEZ
Technical Critic

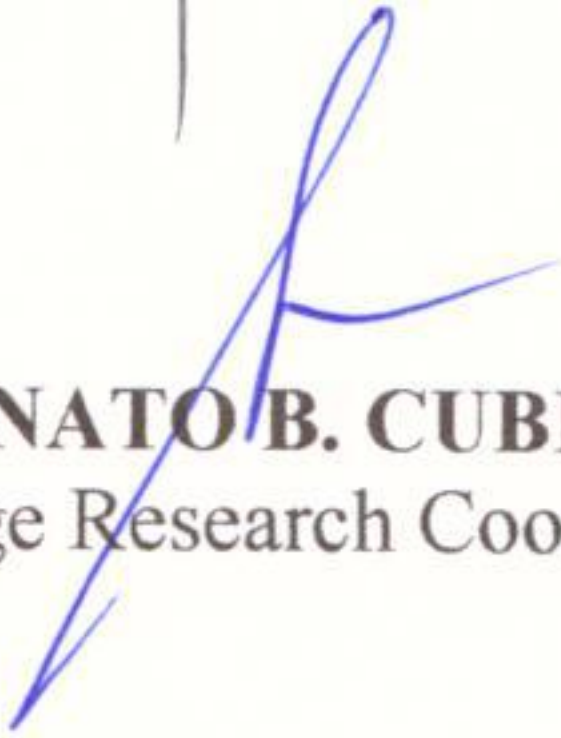
Date


GERRY M. CASTILLO
Unit Research Coordinator


Date


WILLIE C. BUCLATIN
Department Chairperson


Date


RENATO B. CUBILLA
College Research Coordinator

Date


MARILYN M. ESCOBAR
Dean

Date


HOSEA dL. MATEL
Director for Research

5/4/17
Date

OCT 18 2017

ABSTRACT

DANAREEN D. CORNEJO & HARRY D. EDNACOT JR. Cleaner Production Assessment at Carm Foods Enterprises, Inc. An undergraduate thesis. Bachelor of Science in Industrial Engineering. Cavite State University, Indang, Cavite. May 2017. Adviser: Mr. Gerry M. Castillo.

The assessment conducted particularly at Carm Foods Enterprises which produces smoked and dried fishes. Its purpose was to assess the current fish processing, find cleaner opportunities and to provide recommendations that will benefit the system. Through the use of preliminary cleaner production assessment report and series of observation, problems were identified. Problems such as firms do not focus in programs for identifying smelly places and determining the noise level that produces the firm, the absence of face masks and rubber hand gloves for employees, firm had not been re-using the consumed energy, generation of hazardous waste are present due to smoking and cooking process, and using the low end technology. Through these problems, researchers come up with cleaner production recommendations that may benefit the firm.

Recommendations such as utilization of solar drum dryers, fish oil extraction machine, biomass briquette, and solar-powered ice maker may lead for a better output having a high quality and to be able to improve the existing system. Exercising the approach of cleaner production assessment on fish process industry will aid for further refinement of the product and to gain economic and environmental benefits.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA	ii
ACKNOWLEDGEMENT.....	iii
ABSTRACT.....	iv
LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
LIST OF APPENDICES.....	vii
INTRODUCTION	
Statement of the Problem.....	4
Objectives of the Study.....	4
Significance of the Study.....	5
Scope and Limitations.....	5
Conceptual Framework.....	6
Definition of Terms.....	7
REVIEW OF RELATED LITERATURE	
Cleaner Production.....	9
Six Source Reduction Techniques.....	11
Scope of Cleaner Production.....	13
Cost Benefit Analysis of Cleaner Production.....	13
Benefits of CP.....	14
Investment in Cleaner Production.....	16

Cleaner Production in Fish Processing Industry.....	17
Water Consumption in Fish Processing.....	17
Industrial Process Wastewater.....	19

METHODOLOGY

Research Design.....	21
Sources of Data.....	21
Data Gathering Procedure.....	21
Research Instrument.....	22
Data Analysis.....	22
Statistical Treatment.....	23

RESULTS AND DISCUSSION

Background Information.....	24
Process Flow.....	25
Facility Walkthrough.....	28
Community Integration.....	35
Energy Consumption.....	35
Production Area.....	36
Raw Material Handling and Storage.....	36
Waste Management.....	37
Cleaner Production Alternatives.....	37
Introduction of Solar Drum Dryers.....	37
Conversion of Fish Waste to Biofuel.....	39
Integrating Biomass Briquette.....	41

Inception of Solar Ice Maker.....	42
Cost – Benefit Analysis of Alternatives.....	43
Application of Six Source Reduction Techniques.....	44
Facility Layout	46
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	
Summary.....	54
Conclusion.....	55
Recommendations.....	57
REFERENCES.....	58

LIST OF TABLES

Table		Page
1	Six Reduction Techniques.....	11
2	Company's Background	24
3	Company's Land Area	25
4	Production Schedule	25
5	Perceived Level of Current Scenario	28
6	Cleaner Production Alternatives	40
7	Cost – Benefit Analysis of Alternatives	44
8	Identification of Priority Area Matrix	51
9	Sum of Priority Rating Scores	52

LIST OF FIGURES

Figure		Page
1	Conceptual Framework	6
2	Waste Management Hierarchy	13
3	Process Flow Diagram	27
4	Fishbone Diagram	36
5	Solar Drum Dryer	38
6	BioPro190 Automated Biodiesel Processor	41
7	Biomass Briquette	42
8	Simple Solar Ice Maker Blueprint	42
9	Solar Ice Maker	43
10	Legend for Carm Foods Facility Layout	47
11	Carm Foods Facility Layout (Ground Floor)	48
12	Carm Foods Facility Layout (Second Floor)	49
13	Carm Foods Facility Layout (Third Floor)	50

LIST OF APPENDICES

Appendix		Page
A	Letter of Request	63
B	Cleaner Production Assessment Tool	65
C	Assessment Tool From DOST	76