

1. Work Design & Measurement
2. Operations Engineering & Management

PRODUCTION CAPACITY IMPROVEMENT AT CV X

A THESIS

Submitted in Partial Fulfillment of the Requirement for the Degree of
Bachelor of Engineering in Industrial Engineering



JUAN

19 14 10132

**INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM
DEPARTMENT OF INDUSTRIAL ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ATMA JAYA YOGYAKARTA
YOGYAKARTA
2023**

IDENTIFICATION PAGE

A thesis entitled:

PRODUCTION CAPACITY IMPROVEMENT AT CV X

submitted by

Juan

19 14 10132

was examined and approved on 23 October 2023

		Approval Status
Thesis Supervisor 1	: Dr. Ir. Yosephine Suharyanti, S.T., M.T.	Approved
Thesis Supervisor 2	: Dr. Ir. Yosephine Suharyanti, S.T., M.T.	Approved
Board of Examiners		
Chief Examiner	: Dr. Ir. Yosephine Suharyanti, S.T., M.T.	Approved
Examiner 1	: Ir. Adhi Anindyajati, S.T., M.Biotech., Ph.D.	Approved
Examiner 2	: Ir. Fransiska Hernina Puspitasari, S.T., M.Sc.	Approved

Yogyakarta, 23 October 2023

Universitas Atma Jaya Yogyakarta

Faculty of Industrial Technology,

Dean,

(signed)

Dr. Ir. Parama Kartika Dewa SP., S.T., M.T.

DECLARATION OF ORIGINALITY

I certify that the research entitled "Production Capacity Improvement at CV X" in this thesis has not already been submitted for any other degree.

I certify that to the best of my knowledge and belief, this thesis which I wrote does not contain the works or parts of the works of other people, except those cited in the quotations and bibliography, as a scientific paper should.

In addition, I certify that I understand and abide the rule stated by the Ministry of Education and Culture the Republic of Indonesia, subject to the provisions of *Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 17 Tahun 2010 tentang Pencegahan dan Penanggulangan Plagiat di Perguruan Tinggi*.

Yogyakarta, 23 October 2023



Juan

(19 14 10132)

DEDICATION PAGE

To mom, dad, and sis,
You are a gift and a blessing in my life.
Thank you for your love and never-ending support.
No words can describe how much I love you guys and how thankful I am to be a
part of this family.

To Ma'am Yosephine Suharyanti,
Thank you for your help and guidance throughout my thesis journey.
I am forever grateful to have the best lecturer as my supervisor for my final
project.

To my beloved friends,
Thank you for making my life better.
Because of you, I laugh a little harder, cry a little less, and smile a lot more.

ACKNOWLEDGMENT

First, thank God Almighty for His blessings, the author can complete the final thesis on time. This final project is one of the requirements to achieve an Industrial Engineering bachelor's degree at Universitas Atma Jaya Yogyakarta.

Many parties have helped with this project. With the support and encouragement from various parties, this project can be completed properly. Therefore, the author would like to thank:

1. Mr. Chandra S. H., as the operational manager of CV X, who kindly approves and helps this research.
2. Dr. Ir. Parama Kartika Dewa SP., S.T., M.T., as the Dean of Faculty of Industrial Technology Universitas Atma Jaya Yogyakarta.
3. Dr. Ir. Ign. Luddy Indra Purnama, M.Sc., IPU., as the Head of Industrial Engineering Department Universitas Atma Jaya Yogyakarta.
4. Ir. Twin Yoshua Raharjo D., S.T., M.Sc., as the Head of Industrial Engineering Undergraduate Program Universitas Atma Jaya Yogyakarta.
5. Dr. Ir. Yosephine Suharyanti, S.T., M.T., as the author's thesis supervisor, who patiently guides and supports the author throughout the final project.
6. All lecturers in Industrial Engineering Undergraduate Program Universitas Atma Jaya Yogyakarta, who have given the author insights and knowledge during the author's study at Universitas Atma Jaya Yogyakarta.
7. Family and friends, as well as all parties who have helped and supported this final project.

The author is fully aware of potential errors in this report. Therefore, the author is open to any advice for better work in the future.

Hopefully, this thesis can be useful for the readers and society.

Yogyakarta, 23 October 2023

The author,
Juan

TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	Cover	i
	Identification Page	ii
	Declaration of Originality	iii
	Dedication Page	iv
	Acknowledgment	v
	Table of Content	vi
	List of Tables	viii
	List of Figures	x
	List of Appendices	xi
	Abstract	xii
1	Introduction	1
	1.1. Background	1
	1.2. Problem Identification	2
	1.3. Research Problem	11
	1.4. Research Objective	11
	1.5. Research Limitation	11
2	Literature Review and Theoretical Background	12
	2.1. Literature Review	12
	2.2. Theoretical Background	14
3	Solution Alternatives	27
	3.1. Solution Alternatives	27
	3.2. Waste Identification Method Alternatives	28
	3.3. Research Uniqueness	32
4	Research Methodology	33
	4.1. Company Profile	33
	4.2. Research Methodology	33
	4.3. Code of Ethics and Research Standard	38

CHAPTER	TITLE	PAGE
5	Current Situation Analysis	40
	5.1. Production Facility	40
	5.2. Production Quantity and Production Capacity Data	41
	5.3. Waste Identification	44
	5.4. Observation Result	45
6	Improvement Design and Implementation	67
	6.1. Proposed Improvement	67
	6.2. Implementation Phase	75
7	Conclusion	79
	7.1. Conclusion	79
	7.2. Suggestions	79
	References	xiii
	Appendix	xvi

LIST OF TABLES

	TITLE	PAGE
Table 1.1.	Total Costs During January 2020 – December 2022	8
Table 3.1.	Solution Alternatives	27
Table 3.2.	Previous Studies for Waste Identification	29
Table 5.1.	Current Job Description	40
Table 5.2.	Current Operating Machines and Equipment	40
Table 5.3.	Observation Results for Operator 1 Grinding	45
Table 5.4.	Observation Results for Operator 2 Grinding	46
Table 5.5.	Data Uniformity Test Summary for Scooping the Materials	47
Table 5.6.	Data Uniformity Test Summary for Preparing the Sack	48
Table 5.7.	Data Uniformity Test Summary for Pouring the Materials	49
Table 5.8.	Data Uniformity Test Summary for Closing the Sack	51
Table 5.9.	Data Uniformity Test Recapitulation	52
Table 5.10.	Data Adequacy Test Summary for Scooping the Materials	52
Table 5.11.	Data Adequacy Test Summary for Preparing the Sack	52
Table 5.12.	Data Adequacy Test Summary for Pouring the Materials	53
Table 5.13.	Data Adequacy Test Summary for Closing the Sack	53
Table 5.14.	Data Adequacy Test Recapitulation	53
Table 5.15.	Performance Rating for Scooping the Materials	54
Table 5.16.	Allowances for Scooping the Materials	54
Table 5.17.	Performance Rating for Preparing the Sack	55
Table 5.18.	Allowances for Preparing the Sack	55
Table 5.19.	Performance Rating for Pouring the Materials	56
Table 5.20.	Allowances for Pouring the Materials	56
Table 5.21.	Performance Rating for Closing the Sack	57
Table 5.22.	Allowances for Closing the Sack	57
Table 5.23.	Adjustments and Allowances Recapitulation	57
Table 5.24.	Observed Time Calculation	58
Table 5.25.	Normal Time Calculation	58
Table 5.26.	Standard Time Calculation	59
Table 5.27.	Current Gang Process Chart Machine 1	60

	TITLE	PAGE
Table 5.28.	Current Gang Process Chart Machine 2	61
Table 5.29.	Current Gang Process Chart Machine 3	62
Table 5.30.	Current Gang Process Chart Machine 4	63
Table 5.31.	Current Gang Process Chart Machine 5	64
Table 5.32.	Current Gang Process Chart Machine 6	65
Table 6.1.	Proposed Job Description	67
Table 6.2.	Proposed Operating Machines and Equipment	68
Table 6.3.	Comparison Between the Current and the Proposed System	68
Table 6.4.	Comparison Between the Current and the Proposed Capacity	69
Table 6.5.	Proposed Gang Process Chart Machine A and B	71
Table 6.6.	Proposed Gang Process Chart Machine C and D	72
Table 6.7.	Proposed Gang Process Chart Machine E and F	73
Table 6.8.	Proposed Gang Process Chart Machine G and H	74
Table 6.9.	Implementation Results	76
Table 6.10.	Production Data Comparison Before and After Improvement	77

LIST OF FIGURES

	TITLE	PAGE
Figure 1.1.	CV X Business Process	3
Figure 1.2.	Interrelationship Diagram	6
Figure 1.3.	Reasons of One-Time Customers at CV X	7
Figure 1.4.	Production Quantity, Production Capacity, and Sales Data	10
Figure 2.1.	Westinghouse System Skill Ratings	16
Figure 2.2.	Westinghouse System Effort Ratings	17
Figure 2.3.	Westinghouse System Condition Ratings	17
Figure 2.4.	Westinghouse System Consistency Ratings	17
Figure 2.5.	ILO Recommended Allowances	19
Figure 2.6.	Gang Process Chart Example	23
Figure 2.7.	Flow Diagram Example	23
Figure 2.8.	Waste Assessment Questionnaire	26
Figure 4.1.	Empathizing Phase Flowchart	33
Figure 4.2.	Problem Defining Flowchart	34
Figure 4.3.	Ideating and Selection of Solution Flowchart	36
Figure 4.4.	Design and Prototyping Flowchart	37
Figure 4.5.	Implementation and Testing Flowchart	38
Figure 5.1.	Production Quantity and Production Capacity Chart	43
Figure 5.2.	Current Value Stream Mapping	44
Figure 5.3.	Data Uniformity Test Chart for Scooping the Materials	48
Figure 5.4.	Data Uniformity Test Chart for Preparing the Sack	49
Figure 5.5.	Data Uniformity Test Chart for Pouring the Materials	50
Figure 5.6.	Data Uniformity Test Chart for Closing the Sack	51
Figure 5.7.	Current Flow Diagram	66
Figure 6.1.	Proposed Flow Diagram	75
Figure 6.2.	Operator 1 Grinding Helping One Operator 2 Grinding	76
Figure 6.3.	Operator 1 Grinding Helping Two Operator 2 Grinding	76

LIST OF APPENDICES

	TITLE	PAGE
Appendix 1.	Research Approval	xvi
Appendix 2.	Documentation at CV X	xvii
Appendix 3.	Question List for Interview with CV X	xviii
Appendix 4.	Turnitin Result	xix

ABSTRACT

Animal husbandry has become one of the dominant sectors of fulfilling the basic need for nutritious food. In their operations, these industries require animal feed. Seeing this as a business opportunity, CV X has become one of the producers of animal feed, specializing in ruminants feed. However, the stakeholders of CV X still face some problems. The owner states that he receives a low dividend from the company due to the low number of sales. Consequently, the marketing employees complain about the low bonuses that they get because they should receive a bonus for every sold product. Meanwhile, some one-time customers are detected and most of them stop buying from the company due to the expensive products' prices. Since the expensive prices are heavily dependent on inflation and government policies, the customers' concern cannot be solved directly by this research. Nevertheless, the owner hopes that these concerns can be solved without charging the company additional costs.

Based on the problem, waste identification using Value Stream Mapping (VSM) is chosen to later eliminate the wastes detected in the company's production process. Less waste will result in higher production capacity and quantity, so there will be more products available to be sold and operating costs will be lower. Combined with the upcoming marketing strategy the company has planned for the near future, increasing production capacity will greatly help the company.

From the VSM, it is concluded that the grinding department is the bottleneck of the process and has a lot of waste, namely waiting. Moreover, there are two non-operating machines due to the shortage of staff caused by the change of the facility layout in 2022. To solve this issue, a reallocation of the workers' workload in the grinding department is done, so the same number of staff can handle more machines. This research finds that by identifying the waste using VSM and eliminating it by reducing the waiting waste and workers' workload redistribution, the production capacity increases by 33.33%. This implies that the implementation of waste identification and elimination has successfully attained the research objective and solved the solvable stakeholders' concerns.

Keywords: Waste identification, waste elimination, value stream mapping, production capacity, animal feed production