



**IMPROVED INVENTORY REPLENISHMENT, IN  
OVERCOMING DELAYS IN CINNAMON  
SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ**

**UNDERGRADUATED FINAL PROJECT**  
Submitted as one of the requirements to obtain Sarjana Teknik (S.T.)

**By**  
**Mufidul Murhim Nadhirsyah Djibu**  
**004201900050**

**FACULTY OF ENGINEERING**  
**INDUSTRIAL ENGINEERING STUDY PROGRAM**  
**CIKARANG**

**AUGUST, 2023**

## **PANEL OF EXAMINER APPROVAL**

The Panel of Examiners declare that the undergraduate thesis entitled **“IMPROVED INVENTORY REPLENISHMENT, IN OVERCOMING DELAYS IN CINNAMON SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ”** that was submitted by **Mufidul Murhim Nadhirsyah Djibu** majoring in Industrial Engineering from Faculty of Engineering was assessed and approved to have passed the Oral Examination on Tuesday, 29 August 2023.

### **Panel of Examiner**



Andira Taslim, S.T., M.T.

### **Chair of Panel Examiner**



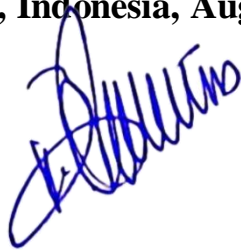
Ir. Hery Hamdi Azwir, M.T.

### **Examiner I**

**THESIS ADVISOR**  
**RECOMMENDATION LETTER**

This Final Project entitled “**IMPROVED INVENTORY REPLENISHMENT, IN OVERCOMING DELAYS IN CINNAMON SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ**” prepared and submitted by **Mufidul Murhim Nadhirsyah Djibu** in partial fulfillment of the requirements for the degree of Bachelor Degree in the Faculty of Engineering has been reviewed and found to have satisfied the requirements for a thesis fit to be examined. I therefore recommend this thesis for Oral Defense.

**Cikarang, Indonesia, August 29<sup>th</sup>, 2023**

A handwritten signature in blue ink, appearing to be 'Anastasia Lidya Maukar', written in a cursive style.

**Anastasia Lidya Maukar ST, M.Sc., M.MT.**

## STATEMENT OF ORIGINALITY

In my capacity as an active student of President University and as the author of the thesis/final project/business plan (underline that applies) stated below:

Name : Mufidul Murhim Nadhirsyah Djibu

Student ID number : 004201900050

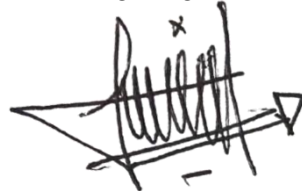
Study Program : Industrial Engineering

Faculty : Engineering

I hereby declare that my thesis/final project/business plan entitled " IMPROVED INVENTORY REPLENISHMENT, IN OVERCOMING DELAYS IN CINNAMON SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ " is to the best of my knowledge and belief, an original piece of work based on sound academic principles. If there is any plagiarism detected in this thesis/final project/business plan, I am willing to be personally responsible for the consequences of these acts of plagiarism and will accept the sanctions against these acts in accordance with the rules and policies of President University.

I also declare that this work, either in whole or in part, has not been submitted to another university to obtain a degree.

Cikarang, August 29<sup>th</sup>, 2023

A handwritten signature in black ink, appearing to read 'Mufidul Murhim Nadhirsyah Djibu', written over a large, stylized, abstract graphic that resembles a signature or a logo.

(Mufidul Murhim Nadhirsyah Djibu)

# SCIENTIFIC PUBLICATION APPROVAL FOR ACADEMIC INTEREST

As an academic community member of the President's University, I, the undersigned:

Name : Mufidul Murhim Nadhirsyah Djibu

Student ID number : 004201900050

Study program : Industrial Engineering

For the purpose of development of science and technology, certify, and approve to give President University a non-exclusive royalty-free right upon my final report with the title:

## **IMPROVED INVENTORY REPLENISHMENT, IN OVERCOMING DELAYS IN CINNAMON SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ**

With this non-exclusive royalty-free right, President University is entitled to converse, to convert, to manage in a database, to maintain, and to publish my final report. There are to be done with the obligation from President University to mention my name as the copyright owner of my final report.

This statement I made in truth.

Cikarang, August 29<sup>th</sup> 2023

A handwritten signature in black ink, appearing to read 'Mufidul Murhim Nadhirsyah Djibu', is written over a large, stylized signature stamp. The stamp consists of a large, irregular shape with a small 'x' at the top and a triangle at the bottom right.

(Mufidul Murhim Nadhirsyah Djibu)

## **ADVISOR APPROVAL FOR JOURNAL/INSTITUTION'S REPOSITORY**

As an academic community member of the President's University, I, the undersigned:

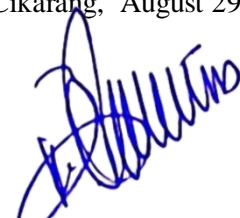
Name : Mufidul Murhim Nadhirsyah Djibu  
ID number : 004201900050  
Study program : Industrial Engineering  
Faculty : Faculty of Engineering

Declare that following thesis:

Title of thesis : IMPROVED INVENTORY REPLENISHMENT, IN  
OVERCOMING DELAYS IN CINNAMON SHIPMENTS IN  
CINNAMON DISTRIBUTOR CV.XYZ  
Thesis author : Mufidul Murhim Nadhirsyah Djibu  
Student ID number : 004201900050

Will be published in **journal/institution's repository** (underline that applies)

Cikarang, August 29<sup>th</sup> 2023

  
( Anastesia Lidya Maukar ST, M.Sc.,  
M.MT)

**IMPROVED INVENTORY REPLENISHMENT, IN  
OVERCOMING DELAYS IN CINNAMON  
SHIPMENTS IN CINNAMON DISTRIBUTOR CV.XYZ**

**By**

**Mufidul Murhim Nadhirsyah Djibu**

**ID No. 004201900050**

Approve by



Anastasia Lidya Maukar ST, M.Sc., M.MT

Thesis Advisor



Ir. Andira Taslim, M.T

Program Head of Industrial Engineering

# SIMILARITY CHECKING RESULT

---

## ORIGINALITY REPORT

---

<b>4%</b>	<b>4%</b>	<b>0%</b>	<b>1%</b>
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

---

## PRIMARY SOURCES

---

<b>1</b>	<b>repository.president.ac.id</b> Internet Source	<b>2%</b>
<b>2</b>	<b>www.coursehero.com</b> Internet Source	<b>&lt;1%</b>
<b>3</b>	<b>Submitted to President University</b> Student Paper	<b>&lt;1%</b>
<b>4</b>	<b>rutcor.rutgers.edu</b> Internet Source	<b>&lt;1%</b>
<b>5</b>	<b>backend.orbit.dtu.dk</b> Internet Source	<b>&lt;1%</b>
<b>6</b>	<b>ftp.idu.ac.id</b> Internet Source	<b>&lt;1%</b>
<b>7</b>	<b>journal.oscm-forum.org</b> Internet Source	<b>&lt;1%</b>
<b>8</b>	<b>www.slideshare.net</b> Internet Source	<b>&lt;1%</b>
<b>9</b>	<b>www.zoho.com</b> Internet Source	<b>&lt;1%</b>

---



10	Submitted to TAFE Queensland Brisbane Student Paper	<1 %
11	Submitted to University of South Africa (UNISA) Student Paper	<1 %
12	developer.apple.com Internet Source	<1 %
13	10times.com Internet Source	<1 %
14	researchrepository.wvu.edu Internet Source	<1 %
15	Submitted to UNITEC Institute of Technology Student Paper	<1 %
16	eprints.utar.edu.my Internet Source	<1 %
17	repository.unugha.ac.id Internet Source	<1 %
18	aei.pitt.edu Internet Source	<1 %
19	www.eurchembull.com Internet Source	<1 %
20	www.insisoc.org Internet Source	<1 %
21	www.nchannel.com Internet Source	<1 %

		<1 %
22	Danny C. K. Ho, K. F. Au, Edward Newton. "Empirical research on supply chain management: A critical review and recommendations", International Journal of Production Research, 2002 Publication	<1 %
23	Dao Nguyen, Simon Somogyi. "The Negative Impacts of Trust in Long-Term Agri-Food Business Relationships", Journal of International Food & Agribusiness Marketing, 2023 Publication	<1 %
24	businessdocbox.com Internet Source	<1 %
25	citeseerx.ist.psu.edu Internet Source	<1 %
26	dr.ntu.edu.sg Internet Source	<1 %
27	eprints.nottingham.ac.uk Internet Source	<1 %
28	orca.cardiff.ac.uk Internet Source	<1 %
29	repositorium.sdum.uminho.pt Internet Source	<1 %

30 silo.pub <1 %  
Internet Source

---

31 www.agaportal.de <1 %  
Internet Source

---

32 www.docstoc.com <1 %  
Internet Source

---

33 www.doria.fi <1 %  
Internet Source

---

34 www.emeraldinsight.com <1 %  
Internet Source

---

35 www.ojs.excelingtech.co.uk <1 %  
Internet Source

---

Exclude quotes Off

Exclude matches Off

Exclude bibliography On

# AI BASED PLAGIARISM CHECKING RESULT

## Stats

**Average Perplexity Score: 1605.724**

---

A document's perplexity is a measurement of the randomness of the text

**Burstiness Score: 7088.332**

---

A document's burstiness is a measurement of the variation in perplexity

Your sentence with the highest perplexity, "*Thesis Advisor*", has a perplexity of: 58744

## ABSTRACT

Delays in product distribution and poor inventory management can have a negative impact on the Company, resulting in customer satisfaction not being fulfilled properly. From these problems, this study aims to anticipate delays in CV delivery. XYZ which is a company engaged in the production of spices, namely cinnamon. One of the problems that cause shipping delays is the shortage of stock caused by the process of replenishing inventory. This research uses an inventory management method, namely Just-In-Time (JIT), so that the appropriate frequency and number of fillings are obtained, so that with the appropriate frequency and number of replenishments the Company can overcome delays in delivery. Then in the process of refining to determine demand by using regression forecasting methods. The research conducted resulted in the determination of the optimal frequency and quantity level of filling with the JIT method can be completed and is good to be applied by the Company. By using the JIT method, replenishment measures can be effective and minimize the Company's losses. Another impact is that the Company can provide the right stock to meet consumer needs with the help of regression forecasting. Based on the results of this study, it shows that the application of the JIT method in determining the frequency and quantity of replenishment is an effective solution to overcome shipping delays caused by insufficient stock when meeting demand.

*(keyword: Replenishment, Inventory, Economic Order Quantity (EOQ), Just-In-Time (JIT), Forecasting, Regresi)*

## ACKNOWLEDGEMENT

This would not have been possible to write thesis is hardly to be done without a big support. Firstly, I would to thank to Almighty God for unconditional love and bless that have given to me. Then, I would like to express my gratitude to:

1. Anastasia Maukar S.T., M.Sc., M.MT.. Thank you so much for guiding me and helping me during making this final project. With your guidance, I can finish this final project.
2. Head of Industrial Engineering; Mam Andira Taslim and all of my lecturers in President University who has inspired and guiding me since my first semester until now. I learn a lot of things that made me what I am today. Thank you so much.
3. My family. Thank you for supporting and taking care of me since I was born. Without all of you I would not become what I am now.
4. My support team: Anglif, Randi, Aan, Kevin, Abay, Frengky, Vael, Danielle, and Mark. Thank you for all of the supports and the togetherness during making this final project. I am so proud that finally we can finish our thesis together. May our hard work and all the late nights will pay off. See you on top guys!
5. Owners of CV Dempo Tanjung Lestari: Mr. Andri who has given me the opportunity to research his company, and several times helped me to work on export projects from the business I started.
6. Baskara Putra, with his spectacular works produced a playlist of Hindia songs that encouraged me in compiling this final project.
7. All of Engineers student batch 2019 that I cannot mention one by one. Thank you for all of the memories we made. Good luck guys.

# TABLE OF CONTENTS

PANEL OF EXAMINER APPROVAL .....	ii
THESIS ADVISOR.....	iii
RECOMMENDATION LETTER.....	iii
STATEMENT OF ORIGINALITY .....	iv
SCIENTIFIC PUBLICATION APPROVAL FOR.....	v
ACADEMIC INTEREST .....	v
ADVISOR APPROVAL FOR JOURNAL/INSTITUTION’S REPOSITORY .....	vi
SIMILARITY CHECKING RESULT .....	viii
AI BASED PLAGIARISM CHECKING RESULT .....	xii
ABSTRACT .....	xiii
ACKNOWLEDGEMENT .....	xiv
TABLE OF CONTENTS.....	xv
LIST OF TABLE.....	xviii
LIST OF FIGURE .....	xx
LIST OF TERMINOLOGIES .....	xxi
CHAPTER I INTRODUCTION .....	1
1.1 Problem Background.....	1
1.2 Problem Statement .....	3
1.3 Objectives .....	3
1.4 Scope .....	3
1.5 Assumption.....	3
CHAPTER II LITERATUR STUDY .....	5
2.1 Spices Industry .....	5
2.2 Distribution Process .....	8
2.3 Supply Chain Network Optimization.....	10
2.4 JIT (Just-In-Time) .....	12
2.5 Regression forecasting method (percentage growth) .....	20
CHAPTER III RESEARCH METHODOLOGY .....	22
3.1 Theoretical Framework.....	22
3.1.1 Problem Identification.....	22
3.1.2 Literature Study .....	23

3.1.3 Data Collection .....	24
3.1.4 Implementation JIT Replenishment Method .....	25
3.1.5 Inventory Improvement.....	26
3.1.6 Conclusion and Recommendation.....	27
3.2 Research Framework.....	27
3.2.1 Delay Analysis.....	28
3.2.2 Calculation of the amount of economical quantity replenishment based on company policy.....	28
3.2.3 Calculation of the amount of economical quantity replenishment using the EOQ method .....	29
3.2.4 Calculation of the amount of economical quantity replenishment using the JIT Replenishment Method.....	29
3.2.5 Inventory Planning for period April 2023 – December 2023.....	29
CHAPTER IV DATA COLLECTION AND ANALYSIS .....	31
4.1 Problem Identification .....	31
4.1.1 Business Process.....	31
4.1.2 Replenishment Process .....	32
4.1.3 Distribution Level.....	33
4.1.4 Company Problem.....	34
4.2 Data Collection.....	35
4.2.1 Product Demand .....	35
4.2.2 Product Inventory .....	36
4.2.3 Demand and inventory chart.....	36
4.2.4 Operational data.....	37
4.2.5 Delivery.....	37
4.2.6 Operating Costs .....	39
4.3 Data Analysis.....	39
4.3.1 Delay Analysis.....	39
4.3.2 Calculation Of The Amount Of Economical Quantity Replenishment Based On Company Policy .....	40
4.3.3 Calculation Of The Amount Of Economical Quantity Replenishment Using The EOQ Method .....	42
4.3.4 Calculation Of The Amount Of Economical Quantity Replenishment With The JIT Replenishment Method .....	44



4.3.5 Comparison Of Results Based On Company Policy, Use Of EOQ Method, and JIT Replenishment Method.....	47
4.4 Inventory Planning for period April 2023 – December 2023.....	49
4.4.1 Application of Just in Time Method in CV. XYZ.....	50
4.4.2 Just in Time and Company .....	51
4.4.3 Demand Forecasting.....	52
4.4.4 JIT Replenishment Analysis .....	54
4.4.5 Sensitivity Analysis.....	58
CHAPTER V CONCLUSIONS AND RECOMMENDATION.....	60
5.1 Conclusions .....	60
5.2 Recommendation.....	60
REFERENCES .....	62
APPENDICES .....	64

## LIST OF TABLE

Table 4. 1 Demand period April 2022 -March 2023.....	36
Table 4. 2 Product Inventory April 2022 -March 2023 .....	36
Table 4. 3 Operational Data April 2022 -March 2023 .....	37
Table 4. 4 Product Delivery April 2022 -March 2023 .....	37
Table 4. 5 Operating Costs .....	39
Table 4. 6 Final Stock Amount April 2022 -March 2023.....	39
Table 4. 7 Quarterly Demand April 2022 -March 2023 .....	40
Table 4. 8 Amount of Quantity Replenishment (Q) April 2022 -March 2023 .....	41
Table 4. 9 Total Replenishment cost April 2022 -March 2023.....	42
Table 4. 10 EOQ (Q*) April 2022 -March 2023 .....	43
Table 4. 11 Replenishment Frequency (N) April 2022 -March 2023 .....	43
Table 4. 12 Total replenishment cost (T*) EOQ methode April 2022 -March 2023.....	44
Table 4. 13 JIT Replenishment optimal number delivery (Na) April 2022 -March 2023.....	45
Table 4. 14 JIT Replenishment optimal Quantity (Qn) .....	45
Table 4. 15 JIT Replenishment The optimal amount of quantity replenishment for each warehouse inventory replenishment (q) .....	46
Table 4. 16 JIT Replenishment frequency replenishment .....	46
Table 4. 17 Total cost of replenishment (T JIT).....	47
Table 4. 18 Comparison of total inventory costs based on company policy, use of EOQ method, and JIT Replenishment method.....	47
Table 4. 19 Quantity Demand Future.....	54
Table 4. 20 EOQ Period April 2023 – December 2023 .....	54
Table 4. 21 Replenishment Frequency (N) Period April 2023 – December 2023 .....	55
Table 4. 22 Total Cost EOQ period April 2023 – December 2023.....	55
Table 4. 23 JIT Replenishment optimal number delivery (na) period April 2023 – December 2023.....	56
Table 4. 24 JIT Replenishment number of replenishment quantity (Qn) period April 2023 – December 2023 .....	56

Table 4. 25 q period April 2023 – December 2023.....	56
Table 4. 26 JIT Replenishment number of replenishment quantity (N*) period April 2023 – December 2023 .....	57
Table 4. 27 JIT Replenishment Total replenishment cost (T JIT) eriod April 2023 – December 2023.....	57

## LIST OF FIGURE

Figure 3. 1 Flow Chart of Research Methodology .....	22
Figure 3. 2 Flow Chart of Research Framework .....	28
Figure 4. 1 Business Process .....	31
Figure 4. 2 Cutting Process.....	32
Figure 4. 3 Distribution Tiers. ....	34
Figure 4. 4 Demand vs Inventory From April 2022 -March 2023 .....	35
Figure 4. 5 Demand and inventory chart .....	37
Figure 4. 6 Replenishment Frequency .....	48
Figure 4. 7 Ordering Cost .....	48
Figure 4. 8 Replenishment Cost .....	49
Figure 4. 9 Demand Growth .....	53
Figure 4. 10 Sensitivity impact to Total replenishment cost .....	59

## LIST OF TERMINOLOGIES

- Replenishment : Replenishment refers to the process of replacing or replenishing the inventory of products or materials that have been depleted or reduced. In the context of inventory management, replenishment is a measure to ensure that inventory remains available in sufficient quantities to meet customer demand or production needs. This process involves determining when and how many products or materials should be ordered to maintain optimal inventory levels.
- Inventory : Inventory refers to a collection of products, materials, or goods stored by a company for use in production or to meet customer demand. Inventory can take many forms, such as finished goods, raw materials, or products in process. Inventory management involves monitoring, controlling, and optimizing inventory to achieve goals of efficiency, effectiveness, and optimal customer service.
- Economic Order Quantity (EOQ) : Economic Order Quantity (EOQ) is the optimal measure of order or the amount of inventory that must be ordered on each order. EOQ tries to find a balance point between ordering costs and storage costs with the goal of reducing total inventory costs. EOQ formulas typically involve variables such as ordering cost, storage cost, and request rate.
- Just-In-Time (JIT) : Just-In-Time (JIT) is an approach to inventory and production management that aims to

reduce or eliminate unnecessary inventory in the supply chain. In a JIT system, materials or components are ordered or manufactured only when needed, thereby reducing storage costs and increasing the efficiency of the production process.

Forecasting : Forecasting is the process of forecasting or predicting an event or condition in the future based on historical data, trends, patterns, and relevant factors. Forecasting techniques are used in a variety of fields, including inventory management, production, marketing, and economics, to aid better decision making.

Regresi : Regression is a statistical method used to analyze the relationship between one or more independent variables and the dependent variable. Simple linear regression involves one independent variable, while multiple linear regression involves more than one independent variable. Regression techniques are often used in predictive analysis and forecasting to identify patterns and trends in data and predict future values