Financial Distress Predictive Analytics n the Basic Materials & Chemical Industry with a Hybrid Clustering and Multinomial Logistic Regression Model

THESIS

Evi Sofiati

2211811006

Master of Management Program

Economics and Social Science Faculty

Universitas Bakrie

Jakarta

2023

Financial Distress Predictive Analytics in the Basic Materials & Chemical Industry with a Hybrid Clustering and Multinomial Logistic Regression Model

THESIS

Submitted as one of the requirements to obtain the Master of Management Degree

Evi Sofiati

2211811006

Master of Management Program

Economics and Social Science Faculty

Universitas Bakrie

Jakarta

2023

APPROVAL PAGE

This Thesis is submitted by	:
Name	: Evi Sofiati, SE
Student Number	: 2211811006
Study Program	: MM
Thesis Title	: Financial Distress PredictiveAnalytics n the Basic Materials & Chemical Industry with a Hybrid Clustering and Multinomial Logistic Regression Model

Has been successfully defended before the Board of Examiners and accepted as part of the requirements needed to obtain a Master of Management degree in the

Economics and Social Science Faculty of the Universitas Bakrie

BOARD OF EXAMINERS

Examiner 1: Gunardi Endro, Ir., M.B.A., M.Hum., M.Soc.Sci., PhD. ( )

Examiner 2: Arief Suharko, PhD. ( )

Advisor : Dr. Jerry Heikal (Jheikal)

Set in : Jakarta.

Date : February 7, 2023.

STATEMENT OF ORIGINALITY

This thesis is the result of my own work,
and all sources either cited or referred to
I have stated correctly.

Name	**: Evi Sofiati, SE**
Student Number	**: 2211811006**
Signature	**:**
Date	**: January 9, 2023**

ACKNOWLEDGMENTS

The author would like to thank to God Almighty, as due to His blessings and mercy, the author can finish this thesis. The writing of this thesis was carried out to fulfill one of the requirements to obtain a Master of Management degree in the Economics and Social Science Faculty of the Universitas Bakrie.

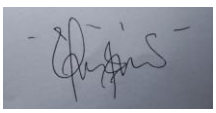
I realize that without the help and guidance of various parties, from the time I started studying until the preparation of this thesis, it would be very difficult for me to complete it. Therefore, I would like to thank:

1) Dr. Jerry Heikal, as the thesis advisor and supervising lecturer who has provided the time, energy, and thoughts to direct me in the preparation and the writing of this thesis;
2) Arief Suharko, PhD, as the Head of Master of Management Study Program, who has also provided valuable feedbacks in the preparation and writing of this thesis;
3) My parents and children who have provided moral support; and
4) Friends who have helped me a lot in completing this thesis.

Finally, the author hopes that God Almighty is pleased to repay all the kindness of all those who have helped. Hopefully this thesis will bring benefits to the development of academic body of knowledge in management.

Jakarta, January 9, 2023

Author



Evi Sofiati, SE

PUBLICATION CONSENT STATEMENT

As part of the student body of the Universitas Bakrie, hereby, I:

Name : Evi Sofiati, SE.

Student Number : 2211811006.

Study Program : Master of Management

Thesis Type : Applied Research

for the sake of academic development, agree to grant the Universitas Bakrie a ***Non-exclusive Royalty-Free Right*** for my academic work entitled:

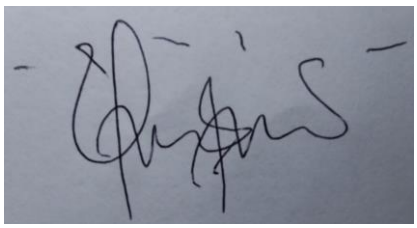
Financial Distress Predictive Analytics in the Basic Materials & Chemical Industry with a Hybrid Clustering and Multinomial Logistic Regression Model

along with existing devices (if needed). With this Non-exclusive Royalty-Free Right, the Universitas Bakrie has the right to store, transfer/format, manage in the form of a database, maintain, and publish my thesis as long as it mentions my name as the author/creator and as the copyright owner for academic purposes.

This statement I made in truth.

Made in: Jakarta.

Date: January 9th, 2023.



(Evi Sofiati, SE.)

Financial Distress Predictive Analytics in the Basic Materials & Chemical Industry with a Hybrid Clustering and Multinomial Logistic Regression Model

Evi Sofiati, SE

ABSTRACTS

This thesis aimed to examine the relationship between financial ratios performance of the companies listed in the Indonesia Stock Exchange Basic Materials and Chemical industry and their likelihood to face financial distress condition using a combined approach of K-Mean Clustering and Multinomial Logistic Regression. Using companies' 2020's financial performance as reflected in 5 (five) financial ratios, namely, Return on Assets (ROA), Return on Equity (ROE), Debt to Equity Ratio (DER), Price to Book Value Ratio (P/BV) and Net Profit Margin (NPM), the study investigated the impact of the pandemic on the companies towards the financial distress likelihood in 2021. The predictive analytics is important to assist investors in their investment decision making process to minimize their risks. The K-Mean Clustering Analysis was first conducted and successfully identified 6 (six) ranked-clusters. Then, predictive modelling using Multinomial Logisitic Regression was conducted to compute the Y Values associated with each cluster. The results showed 2 (two) lowest ranked clusters potentially associated closely with financial distress, i.e., Cluster 4 (potentially negatively impacted) and Cluster 0 (potentially highly negatively impacted) contained 2 (two) companies, namely, Tridomain Performance Materials Tbk and Charoen Pokphand Indonesia Tbk. From Multinomial Logistic Regression calculation, Y values of those 2 bad clusters were 0.02 and 0.04 which are far from 1, meaning that those 2 (two) companies should not belong to the clusters. Thus, their financial distress likelihoods in 2021 should be low. Hence, the hybrid model shows its efficacy in ascertaining the financial distress likelihood in which the clustering results are redeliberated by the multinomial logistic regression.

Keywords: Hybrid Model; K-Mean Clustering Analysis; Multinomial Logistic Regression; Financial Ratios; Basic Materials and Chemicals; Indonesia Stock Exchange.

Table of Contents

CHAPTER 1: INTRODUCTION 1

1.1 Background 1

1.2. Problem Statement 3

1.3. Research Objectives 3

1.4. Research Benefits 3

1.4.1. Benefit for Academic Community 4

1.4.2. Benefit for Business Community 4

1.5. Research Limitation 5

CHAPTER 2: LITERATURE REVIEW 6

2.1. Literature Review 6

2.2. Grand Theory 16

2.3. Financial Ratios 16

2.3.1. Return on Assets (ROA) 18

2.3.2. Return on Equity (ROE) 18

2.3.3. Debt to Equity Ratio (DER) 18

2.3.4. Price to Book Value (P/BV) 19

2.3.5. Net Profit Margin (NPM) 19

2.4. Research Flowchart 20

CHAPTER 3: RESEARCH METHODOLOGY 21

3.2. K – Means Clustering Algorithm 22

3.3. Multinomial Logistic Regression – Predictive Modelling 23

CHAPTER 4 DISCUSSION AND RESULTS 25

4.2. Results 32

4.3. Validation 33

4.3.1. Financial Ratios Clustering 39

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS 48

5.1. Conclusions 48

5.2. Recommendations 49

References 50