A REVIEW ON BIG DATA ANALYTICS APPLICATION FOR NEW FOOD PRODUCT DEVELOPMENT PROCESS

SEBUAH REVIEW TENTANG APLIKASI ANALISIS BIG DATA UNTUK PROSES PENGEMBANGAN PRODUK PANGAN BARU

BACHELOR THESIS

Submitted as partial fulfillment of the requirements
for obtaining a Bachelor Degree of Food Technology

By:
SOVIE ANGGRAENI
18.I1.0164

DEPARTMENT OF FOOD TECHNOLOGY
FACULTY OF AGRICULTURAL TECHNOLOGY
SOEGIJAPRANATA CATHOLIC UNIVERSITY
SEMARANG

2021

STATEMENT OF BACHELOR THESIS AUTHENTICITY

The undersigned below:

Name	: Sovie Anggraeni
Department	: Food Technology
Faculty	: Agricultural Technology
Type of Work	: A Review on Big Data Analytics Applications for New Food Product Development Process

I hereby declare that my thesis entitled **"A REVIEW ON BIG DATA ANALYTICS APPLICATION FOR NEW FOOD PRODUCT DEVELOPMENT PROCESS"** had never been submitted to obtain a bachelor's degree in any institution, and to the best of my knowledge, no work has ever been written or published by anyone, except those referred to in this manuscript and mentioned in the bibliography.

If in the future, it is proven that this thesis is partially or wholly the result of plagiarism, then I am willing to be canceled with all the legal consequences in accordance under the applicable regulations at the Soegijapranata Catholic University and/or the applicable laws and regulations.

Semarang, August 20, 2021

Sovie Anggraeni

18.I1.0164

A REVIEW ON BIG DATA ANALYTICS APPLICATION FOR NEW FOOD PRODUCT DEVELOPMENT PROCESS

SEBUAH REVIEW TENTANG APLIKASI ANALISIS BIG DATA UNTUK PROSES PENGEMBANGAN PRODUK PANGAN BARU

By:

Sovie Anggraeni

18.I1.0164

Department of Food Technology

This bachelor thesis has been defended and approved in front of examiners on August 20, 2021

Semarang, August 20, 2021
Faculty of Agricultural Technology
Soegijapranata Catholic University

Supervisor I,

Dr. R. Probo Yulianto N., S.TP., M.Sc.

Dean,

Dr. R. Probo Yulianto N., S.TP., M.Sc.

Supervisor II,

R. S. Aji Nugroho S.T., MCompIT., Ph.D

PUBLICATION STATEMENT OF SCIENTIFIC WORKS FOR ACADEMIC INTEREST

The undersigned below:

Name	: Sovie Anggraeni
Department	: Food Technology
Faculty	: Agricultural Technology
Type of Work	: A Review on Big Data Analytics Applications for New Food Product Development Process

Disagree to give Non-Exclusive Royalty Free Rights for a scientific work entitled "A Review on Big Data Analytics Applications for New Food Product Development Process" along with existing tools (if needed) to Soegijapranata Catholic University Semarang. With this Non-Exclusive Royalty Free Rights, Soegijapranata Catholic University has the right to save, transfer media/ format, manage in the form of a database, take care, and publish this final project as long as it still includes my name as the author/ creator and as the owner of the Copyright.

Hereby this statement is made truthfully and to be used accordingly.

Semarang, August 20, 2021

Author,

Sovie Anggraeni

ACKNOWLEDGEMENT

First of all, the author would like to praise and thank God Almighty because of the grace the author was able to complete this bachelor thesis with the title "A Review on Big Data Analytics Applications for New Food Product Development Process" to fulfill the requirements for obtaining a Bachelor Degree in Food Technology at the Faculty of Agricultural Technology, Catholic University Soegijapranata Semarang. Of course, there are always obstacles and difficulties in the process of completing this project.

Nevertheless, the support and assistance from various parties greatly helped the author in finishing this study properly and on time. Therefore, the author would like to express her deepest gratitude to:

1. God, The Almighty who has given grace and opportunity to the author in working on this thesis.
2. Dr. R. Probo Y. Nugrahedi, S.TP., M.Sc. as the Dean of Faculty of Agricultural Technology at Soegijapranata Catholic University, Semarang and supervisor I who has guided the author from the beginning to the end of writing the thesis.
3. R. Setiawan Aji Nugroho S.T., MCompIT., Ph.D as supervisor II who has helped guide the author in completing this thesis report.
4. All lecturers and administrative staff of the Faculty of Food Technology who have helped and provided useful knowledge and information for the author.
5. Father, mother, younger sister, and younger brother who always give encouragement, support, and assistance throughout the writing of this thesis.
6. All of the writer's family, friends, and all parties that cannot be mentioned one by one for their support and encouragement for the author.

The author realizes that this review is far from perfect and has many shortcomings. Therefore, the author is very open in accepting constructive criticism and suggestions from readers to improve this paper. The author also

apologizes for the errors or deficiencies that are less pleasing to the reader. Finally, the author greatly hopes that this thesis can be useful for all readers and those who need it.

Semarang, August 20, 2021

Author,

Sovie Anggraeni

ABSTRACT

One real example of the results of science and technology development is Big Data. Big Data is a collection of very large and complex data. Volume, variety, and velocity are the three primary characteristics of Big Data and are commonly referred to as 3V of Big Data. Because of the characteristics, Big Data has many advantages in its application. New product development plays an important role in the company's future because it is the key to the sustainability and development of an industry. However, the review of Big Data Analytics applications that focus on the new food product development process in the food industry is still limited. Therefore, this study will review the application of Big Data Analytics for the new food product development process. This study aims to review the application of Big Data Analytics for new food product development processes covering the implementation, techniques, and types of Big Data Analytics that are used in the new food product development process. The methodology used in this research is a literature review. The inclusion criteria used in this study were non-full-review, accessible English articles within the same topic, and published in 2011-2021. Big Data Analytics can be used in various stages of new food product development. The application of Big Data can make it easier to access certain information needed more quickly and precisely so as to reduce time and effort in the new food product development process. Nevertheless, experts, tools, and analytical techniques are needed in using Big Data so that data selection can be done properly and efficiently.

Keywords: Big Data Analytics, Food Industry, New Food Product Development, Review

ABSTRAK

Salah satu contoh nyata hasil perkembangan ilmu pengetahuan dan teknologi adalah *Big Data*. *Big Data* adalah kumpulan data yang sangat besar dan kompleks. Volume, variasi, dan kecepatan adalah tiga karakteristik utama *Big Data* dan biasanya disebut sebagai *3V of Big Data*. Akibat karakteristiknya, aplikasi Big Data memiliki banyak keunggulan. Pengembangan produk baru memegang peranan penting bagi masa depan perusahaan karena merupakan kunci keberlangsungan dan perkembangan suatu industri. Namun, review mengenai *Big Data Analytics* yang berfokus pada proses pengembangan produk pangan baru di industri pangan masih terbatas. Oleh karena itu, penelitian ini akan mengkaji penerapan *Big Data Analytics* untuk proses pengembangan produk pangan baru. Studi ini bertujuan untuk mengkaji penerapan *Big Data Analytics* untuk proses pengembangan produk makanan baru yang meliputi implementasi, teknik, dan jenis *Big Data Analytics* yang digunakan dalam proses pengembangan produk makanan baru. Metodologi yang digunakan dalam penelitian ini adalah *literature review*. Kriteria inklusi yang digunakan dalam penelitian ini adalah artikel *non-review*, berbahasa Inggris, dapat diakses penuh, memiliki cakupan topik yang sama, dan diterbitkan dalam tahun 2011-2021. *Big Data Analytics* dapat digunakan dalam berbagai tahap pengembangan produk makanan baru. Salah satu teknik Penerapan *Big Data* dapat mempermudah dalam mengakses informasi yang dibutuhkan dengan lebih cepat dan tepat sehingga dapat mengurangi waktu dan tenaga dalam pengembangan produk. Namun, tenaga ahli, alat, serta teknik analisis diperlukan dalam penggunaan Big Data agar proses pemilihan data terselesaikan dengan baik dan efisien.

Kata Kunci: *Big Data Analytics*, Industri Pangan, Pengembangan Produk Pangan Baru, *Review*

TABLE OF CONTENTS

STATEMENT OF BACHELOR THESIS AUTHENTICITY i
ENDORSEMENT PAGE ii
PUBLICATION STATEMENT OF SCIENTIFIC WORKS FOR ACADEMIC INTEREST iii
ACKNOWLEDGEMENT iv
ABSTRACT vi
ABSTRAK vii
TABLE OF CONTENTS viii
LIST OF FIGURES x
LIST OF TABLES xi
I. INTRODUCTION 1
1.1. Background 1
1.2. Theoretical Overview 2
1.2.1. New Food Product Development 2
1.2.2. Big Data Analytics 7
1.3. Research Questions 8
1.4. Objectives 8
II. METHODOLOGY 9
2.1. Methodology 9
2.1.1. Research Time 9
2.1.2. Flow Chart of Research 9
2.1.3. Gap Analysis 9
2.1.4. Literature Collection 12
2.1.5. Literature Selection 13
2.1.6. Literature Analysis 14
2.1.7. Literature Review 14
III. BIG DATA ANALYTICS IMPLEMENTATION, TYPES, TECHNIQUES, AND TOOLS 15
3.1. Big Data Analytics Types 15

3.1.1. Descriptive Analytics 15
3.1.2. Predictive Analytics 15
3.1.3. Diagnostic Analytics 15
3.1.4. Prescriptive Analytics 16
3.2. Big Data Implementation 16
3.3. Big Data Techniques 17
3.3.1. Data Mining 17
3.3.2. Machine Learning 19
3.3.3. Social Network Analysis 19
3.3.4. Optimization Methods 19
3.3.5. Web Mining 19
3.3.6. Artificial Neural Networks 20
3.4. Big Data Analytics Tools 20
IV. BIG DATA APPLICATIONS FOR NEW FOOD PRODUCT DEVELOPMENT PROCESS 22
4.1. Generating Ideas & Screening 27
4.2. Product Concept & Design Development 28
4.3. Marketing Strategies Development 32
4.4. Product Development 34
4.5. Market Testing 36
V. CONCLUSION AND SUGGESTION 40
5.1. Conclusion 40
5.2. Suggestion 40
VI. REFERENCES 41
VII. ATTACHMENT 51
7.1. Plagiarism Check 51

LIST OF FIGURES

Figure 1. Flow Chart of Research 9
Figure 2. Flow Chart of Review Articles Analysis 10
Figure 3. Variables Involved in This Review 12
Figure 4. Literature Selection.....14

LIST OF TABLES

Table 1. Types of New Food Product 2
Table 2. Big Data Tools 20
Table 3. Articles That Discuss Big Data Applications for New Food Product Development Process 22