

**STUDENTS' AWARENESS ON FOOD WASTE PROBLEMS AND  
THEIR BEHAVIOUR TOWARDS FOOD WASTAGE:  
A CASE STUDY OF DIPONEGORO UNIVERSITY (UNDIP)-TEMBALANG CAMPUS.**



**THESIS**

**Submitted in Partial Fulfilment of the Requirement for the Award of Master of environmental  
science Degree of Diponegoro University**

**BY**

**PRAYGOD P. MGANGA**

**NIM: 30000119419026**

**MASTER PROGRAM OF ENVIRONMENTAL SCIENCE  
SCHOOL OF POSTGRADUATE STUDIES  
DIPONEGORO UNIVERSITY  
SEMARANG  
2021**

**APPROVAL PAGE**  
**STUDENTS' AWARENESS ON FOOD WASTE PROBLEMS AND THEIR**  
**BEHAVIOUR TOWARDS FOOD WASTAGE:**

**A CASE STUDY OF DIPONEGORO UNIVERSITY (UNDIP)-TEMBALANG CAMPUS.**

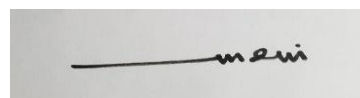
By:  
PRAYGOD P MGANGA  
30000119419026

Supervisor I



Prof.Dr. Ir. Syafrudin, CES, M.T  
NIP.195811071988031001

Supervisor II



Dr Drs.Amirudin, M. Si  
NIP.196710241993031003

Dean of the College of Graduate  
Studies

Head of the Master's program in  
Environmental Sciences



Dr. R. B. Sularto, SH., M. Hum.  
NIP. 19670101 199103 1 005

Dr. Eng. Maryono, S.T., M.T.  
NIP. 197508112000121001

**ENDORSEMENT PAGE**  
**STUDENTS' AWARENESS ON FOOD WASTE PROBLEMS AND THEIR**  
**BEHAVIOUR TOWARDS FOOD WASTAGE:**  
**A CASE STUDY OF DIPONEGORO UNIVERSITY (UNDIP)-TEMBALANG CAMPUS.**

By

**PRAYGOD P MGANGA**

**NIM 30000119419026**

This thesis was defended in front of the team of examiners on date of **30 June 2021**, and was declared eligible for acceptance.

**EXAMINATION TEAM:**

Chairman

Signature,

Dr. Jafron Wasiq Hidayat, M.Si.



Member,

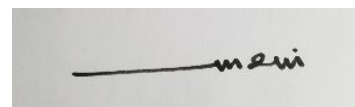
1. Dr. Fuad Muhammad, S. Si, M. Si



2. Prof. Dr Ir. Syafrudin, CES, M.T.



3. Dr Drs. Amirudin, M. Si



## DECLARATION

I, Praygod P. Mganga, with Student Identification Number 30000119419026 herewith declare that, to the best of my knowledge, the thesis entitled “Students’ awareness on food waste problems and their behaviour towards food wastage” is my original work and has never been submitted in a whole or part to any other higher learning institution or university for the award of any degree. All academic materials used in this thesis were properly acknowledged.

Semarang, 30 June 2021.

Author,



PRAYGOD P. MGANGA

NIM 30000119419026

## AUTHORS' BIOGRAPHY



Praygod P. Mganga, born on August 1, 1992, in Tanga, Tanzania. The author graduated primary school in 2006 and afterwards junior secondary school in 2010. Furthermore, the author continues with advanced high school and graduated in February 2013. The author attained his first Bachelor degree in Urban Development and Environmental Management at the Institute of Rural Development Planning (IRDP), Dodoma, Tanzania in December 2016.

The author continues with further studies and pursue his Master's degree in Environmental science at the Diponegoro University in Indonesia, enrolled in the intake of 2019. This thesis entitled "Students' awareness on food waste problems and their behaviour towards food wastage, a case of Diponegoro University, Tembalang Campus" is one of the requirements for the award of a Master of environmental science degree of Diponegoro University.

## FOREWORD

Firstly, I would like to return my thanks to the almighty GOD who gives me strength and power to better survive in this world and enabled me to complete successfully my studies. It has been a long journey that I admit without GOD, it would not be completed.

I would like to express my solemn gratitude to my supervisor Prof. Dr Ir. Syafrudin, CES, M. T and Dr Drs. Amirudin, M. Si, through their direction, criticism, advice, and diligence guided me until this work was enhanced. I feel very honoured and proud to have an opportunity to work under their supervision. I also extend my gratitude and appreciation to the chairman of the examination team Dr Jafron Wasiq Hidayat, M. Si for his constructive suggestions and advice, I also return thanks to the second examiner Dr Fuad Muhammad, S. Si, M. Si for his constructive comments and advice.

I wish to express my appreciation to all the lecturers who taught me at the school of the postgraduate and the entire staff of the Master of environmental science program for their tireless effort and support to help me feel at home during my studies.

I am thankful to the Government of the united republic of Tanzania and the Government of the Republic of Indonesia for their cooperation, of which I got this unequalled opportunity to pursue a Master Degree. On the same note, I want to convey my solemn gratitude to the entire staff of the International Office of Diponegoro University who have been helpful to me in tremendous ways during my studies.

Lastly, I wish to extend my special thanks to the family members including my mother Demetria Mganga, brothers and sisters who provided support and courage wherever I feel down and through their prayers made this journey possible. On the same note, would like to return many thanks to all of my friends and colleagues who have been together in this journey.

May the Almighty God bless you all!

## TABLE OF CONTENT

<b>APPROVAL PAGE .....</b>	<b>i</b>
<b>ENDORSEMENT PAGE .....</b>	<b>ii</b>
<b>DECLARATION.....</b>	<b>iii</b>
<b>AUTHORS' BIOGRAPHY .....</b>	<b>iv</b>
<b>FOREWORD.....</b>	<b>v</b>
<b>TABLE OF CONTENT.....</b>	<b>vi</b>
<b>LIST OF FIGURES .....</b>	<b>viii</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>LIST OF ACRONYMS .....</b>	<b>x</b>
<b>LIST OF APPENDICES .....</b>	<b>xi</b>
<b>ABSTRACT .....</b>	<b>xii</b>
<b>ABSTRAK .....</b>	<b>xiii</b>
<b>CHAPTER I INTRODUCTION .....</b>	<b>1</b>
<b>1.1. Background information .....</b>	<b>1</b>
<b>1.2. Statement of the problem .....</b>	<b>5</b>
<b>1.3. Research Objectives.....</b>	<b>6</b>
1.3.1 Research questions.....	6
<b>1.4. Research hypothesis.....</b>	<b>7</b>
<b>1.5. Significance of the research.....</b>	<b>7</b>
<b>1.6. Scope and limitations of the study .....</b>	<b>7</b>
<b>CHAPTER II LITERATURE REVIEW .....</b>	<b>9</b>
<b>2.1. An overview of food loss, waste and wastage.....</b>	<b>9</b>
2.1.2. Food loss and waste occurrences and its definition .....	9
2.1.3 Why should we care for food waste and loss? .....	11
<b>2.2. Food waste management Hierarchy .....</b>	<b>13</b>
<b>2.3. The role played by the Government of Indonesia and Higher education institutions to manage, prevent and reduce all sorts of waste generation.....</b>	<b>15</b>
2.3.1 Government efforts to prevent and minimize waste generation in Indonesia.....	15
2.3.2 Institutional framework and effort to prevent and minimize waste generation, a case of Universitas Diponegoro (UNDIP) .....	16
<b>2.4. Related studies on food waste problem in the Household and Higher learning Institutions .....</b>	<b>17</b>
<b>2.5. Research gap.....</b>	<b>21</b>
<b>2.6. Theoretical review of food waste behaviour .....</b>	<b>22</b>
<b>2.7. Conceptual model.....</b>	<b>26</b>

<b>CHAPTER III RESEARCH METHOD .....</b>	<b>27</b>
<b>3.1. Research type and design Approach .....</b>	<b>27</b>
<b>3.2. Location and time of the research .....</b>	<b>27</b>
<b>3.3. Population and sampling .....</b>	<b>27</b>
3.3.1. Population .....	27
3.3.2. Sampling .....	28
<b>3.4. Data types and source .....</b>	<b>29</b>
3.4.1. Primary data .....	29
3.4.2. Secondary Data .....	29
<b>3.5. Data collection technique .....</b>	<b>29</b>
<b>3.6. Data analysis technique .....</b>	<b>30</b>
<b>3.7. Justification of food waste modelling through the application of the PLS-SEMs approach .....</b>	<b>31</b>
<b>3.8. Diagram of Data analysis process.....</b>	<b>38</b>
<b>3.9. Research Procedures .....</b>	<b>39</b>
<b>CHAPTER IV RESULTS AND DISCUSSION .....</b>	<b>40</b>
<b>4.1 Results .....</b>	<b>40</b>
4.1.1 Demographic and background characteristics of respondents .....	40
4.1.2 Model evaluation and assessment .....	41
4.1.3. Mediation Analysis .....	47
4.1.4. Multigroup Analysis (PLS-MGA) .....	48
4.1.5. Importance-Performance Map Analysis (IPMA).....	53
<b>4.2 Discussion.....</b>	<b>56</b>
<b>CHAPTER V CONCLUSION AND RECOMMENDATION .....</b>	<b>61</b>
<b>5.1. Conclusion .....</b>	<b>61</b>
<b>5.2. Recommendation.....</b>	<b>62</b>
<b>References.....</b>	<b>64</b>
<b>Appendices.....</b>	<b>72</b>



**LIST OF FIGURES**

FIGURE 1. FOOD WASTE HIERARCHY .....	14
FIGURE 2 THE THEORY OF PLANNED BEHAVIOUR (AJZEN,1991).....	23
FIGURE 3. CONCEPTUAL FRAMEWORK MODEL (SOURCE: AUTHOR).....	26
FIGURE 4.THE SPECIFIED STRUCTURAL MODEL (INNER MODEL) .....	32
FIGURE 5.THE SPECIFIED INNER AND OUTER MODEL (MEASUREMENT MODEL).....	34
FIGURE 6. PLS SEM ANALYSIS PROCESS (SOURCE: AUTHOR) .....	38
FIGURE 7. RESEARCH FLOW CHART .....	39
FIGURE 8.SHOWS THE RESULTS OF CAUSAL (PATH COEFFICIENT) RELATIONSHIP IN THE EXTENDED MODEL .....	47
FIGURE 9.INTENTION TO (AVOID OR REDUCE) FOOD WASTE BEHAVIOUR.....	54
FIGURE 10.CORRECT BEHAVIOUR TOWARDS FOOD WASTE(IPMA) .....	55

**LIST OF TABLES**

TABLE 1 <b>TOTAL SAMPLE ACCORDING TO RESPECTIVE FACULTIES IN UNDIP</b> .....	28
<b>TABLE 2 SUMMARY TABLE OF VARIABLES AND INDICATORS</b> .....	34
TABLE 3. <b>BACKGROUND CHARACTERISTICS OF THE RESPONDENTS</b> .....	40
TABLE 4 <b>CONSTRUCT VALIDITY AND RELIABILITY</b> .....	42
TABLE 5. <b>FORNELL AND LARCKER TEST FOR DISCRIMINANT VALIDITY</b> .....	43
TABLE 6. <b>HETEROTRAIT-MONOTRAIT RATIO CRITERION (HTMT)</b> .....	43
TABLE 7. <b>THE RESULTS OF THE STATISTICAL RELATIONSHIP IN THE MODEL</b> .....	46
TABLE 8. <b>MEDIATION ROLE OF “INTENTION” TO AVOID OR REDUCE FOOD WASTE</b> .....	48
TABLE 9. <b>BOOTSTRAPPING RESULTS FOR FEMALE STUDENTS</b> .....	50
TABLE 10. <b>BOOTSTRAPPING RESULTS FOR MALE STUDENTS</b> .....	51
TABLE 11. <b>PARAMETRIC TEST RESULTS</b> .....	52
TABLE 12. <b>WELCH-SATTERTHWAIT TEST RESULTS</b> .....	53

**LIST OF ACRONYMS**

EU-European Union

FAO-Food and Agricultural Organization

GDP-Gross Domestic Product

SDG-Sustainable Development Goals

TPB-Theory of Planned Behaviors

UN-United Nations

UNDIP-Diponegoro University

UNICEF-United Nation Children's Fund

US-United states of America

USD-United States Dollar

UK-United Kingdom

ReFED-Rethinking Food Waste Through Economic Data

**LIST OF APPENDICES**

APPENDIX 1. QUESTIONNAIRE SURVEY GUIDE .....	72
APPENDIX 2. GENERAL DESCRIPTIONS ABOUT THE QUESTIONNAIRE SURVEY .....	73
APPENDIX 3. QUESTIONNAIRE GUIDELINES.....	74

## ABSTRACT

In the 21 century, food waste has become one of the prevailing and unsolved problems to which the world still pays full attention and looking for a better way to resolve. Given the fact that about one-third of the food produced in the world end up trashed or lost is unbearable. Consumers of young age(youth) proved to be the potential group that waste more food than the rest and thus need to be paid close attention and monitored. The majority of this group are found in higher learning institutions and hence this study based on the survey of 100 students at the University of Diponegoro in Semarang (Indonesia), aims at investigating student's awareness of food waste problems and their behaviour towards food waste by deploying the framework of the Theory of planned behaviour. By means of the structural model (PLS-SEM) approach, this study explores the different relationships between individual attitudes, concern on food waste, Norms, Intention and behaviour towards food waste. It also aims at observing the influence of gender on the relationship between different constructs developed understudy as well as verifying the existence of mediation effects among these relationships. The establishment of the importance of performance map analysis developed to enable identify and observe relative importance of predictor variable which highlight potential influence of correct behaviour towards food waste and various decision to be taken to ensure reduction and avoid of food wastage. Results show the essence of using an extended model of planned behaviour by predicting and explaining student intention to avoid or reduce food waste and determinant of positive(correct) behaviour towards food waste. student awareness on environmental and social consequences of food waste behaviour, awareness on economic consequences of food waste behaviour were the main drivers to motivate student's intention to avoid or reduce food waste, Besides, the results show that subjective norms, individual concern towards food waste found to be the determinants of positive behaviour towards food waste. While perceived behaviour control played an important role in determining both student intention to avoid or reduce food waste and their behaviour toward food waste. Student's gender showed no significant influence on any relationship between constructs in the model, there was no mediator effect played by the target construct in the model. Finally, the implication of the study for raising student's awareness of the food waste problem and its impacts, and improving correct behaviour toward food waste are discussed.

*Keywords: Diponegoro University; Food waste; PLS-SEM; Students.*

## ABSTRAK

*Di abad ke-21, limbah makanan menjadi salah satu masalah utama yang belum terpecahkan dimana dunia masih memberi perhatian dan mencari solusi terbaik untuk menyelesaikannya. Fakta menunjukkan bahwa sekitar sepertiga dari makanan yang diproduksi di dunia terbuang, ini merupakan hal yang tidak dapat ditoleransi. Konsumen usia muda (remaja) terbukti menjadi kelompok potensial yang membuang lebih banyak makanan daripada yang lain sehingga perlu mendapat perhatian dan pemantauan lebih. Mayoritas kelompok ini ditemukan di perguruan tinggi dan oleh karena itu, penelitian ini dilakukan melalui survei terhadap 100 mahasiswa di Universitas Diponegoro di Semarang (Indonesia), bertujuan untuk meneliti kesadaran mahasiswa mengenai masalah sampah makanan dan perilaku mereka terhadap sampah makanan dengan menyebarkan kerangka Teori perilaku yang direncanakan (Theory of planned behaviour). Melalui pendekatan model struktural (PLS-SEM), penelitian ini mengeksplorasi perbedaan hubungan antara sikap individu, kepedulian terhadap limbah makanan, norma, niat, dan perilaku terhadap limbah makanan. Penelitian ini juga bertujuan untuk mengamati pengaruh gender pada hubungan antara konstruksi yang berbeda yang dikembangkan sebagai pengganti serta memverifikasi adanya efek mediasi antara hubungan-hubungan ini. Penetapan pentingnya analisis peta kinerja dikembangkan untuk mengidentifikasi dan mengamati kepentingan relatif dari variabel prediktor yang menyoroti potensi pengaruh perilaku yang benar terhadap limbah makanan dan berbagai keputusan yang harus diambil untuk memastikan pengurangan dan menghindari limbah makanan. Hasil penelitian menunjukkan inti dari penggunaan model perilaku terencana yang diperluas dengan memprediksi dan menjelaskan niat mahasiswa untuk menghindari atau mengurangi limbah makanan dan determinan perilaku positif (benar) terhadap limbah makanan. Kesadaran mahasiswa mengenai konsekuensi lingkungan dan sosial dari perilaku membuang-buang makanan, kesadaran tentang konsekuensi ekonomi dari perilaku membuang-buang makanan adalah pendorong utama untuk memotivasi niat mahasiswa untuk menghindari atau mengurangi limbah makanan. Selain itu, hasil penelitian ini menunjukkan bahwa norma subjektif, kepedulian individu terhadap sisa makanan ditemukan menjadi penentu perilaku positif terhadap limbah makanan. Sementara kontrol perilaku yang dipersepsikan berperan penting dalam menentukan perhatian mahasiswa untuk menghindari atau mengurangi limbah makanan dan perilaku mereka terhadap limbah makanan. Jenis kelamin mahasiswa tidak menunjukkan pengaruh yang signifikan terhadap hubungan antara konstruksi dalam model, tidak ada efek mediator yang dimainkan oleh konstruk target dalam model. Dengan demikian, implikasi dari penelitian ini adalah untuk meningkatkan kesadaran mahasiswa mengenai permasalahan limbah makanan dan dampaknya, serta meningkatkan perilaku yang benar terhadap penanganan limbah makanan.*

**Kata kunci:** *Limbah makanan; PLS-SEM; Siswa; Universitas Diponegoro.*