# THESIS/ DIPLOMA THESIS

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## Strategic Approaches to Reducing Food Waste in the Households Area in Indonesia

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#### **CHAPTER 1**

#### **INTRODUCTION**

#### **1.1 BACKGROUND AND CONTEXT**

One of the world's problems that has been talked about for many years is food waste, not only it is concerning from an environmental aspect but also from the global perspective of food security, which also plays an important role in the economy of countries, areas, and regions. The global issue of food waste brings attention to everybody in the world, not only countries, and businesses but also Non-Profit Organizations that work with food-related fields. Worldwide, approximately one-third of the food intended for human consumption is lost or wasted, totaling up to 1.3 billion tonnes of food annually (Gustavsson et al., 2011, Schanes et al., 2018). Food waste concerns many things, including the food chain, the process of it, and how it is stored, packed, and transported. The energy and green gas emissions that have been used during the process of the food chain are considered a large amount, however, they lose their value in the end because of the waste, which came from the waste of the household area as the biggest contribution of the food waste globally.

The topic of food waste in Indonesia is also one of the crucial topics that has been discussed. Indonesia is one of the most populated countries in the world with over 270 million populations according to World Bank as of 2021. With the amount of population that the country currently has, this topic plays vital roles not only in the economic field, but also in cultural, social, and most importantly environmental. Indonesia ranks as the world's second-largest producer of food waste (FW), generating an estimated 300 kg of FW per capita annually. Additionally, the country faces the third-highest prevalence of stunted children at 36.4%, trailing behind Nigeria at 32.9% (The Economist Intelligence Unit, 2017, Farahdiba et al., 2023). Food concerns in Indonesia as mentioned, are also affected by how people's culture in everyday life, especially in households, norms, and practices can also influence the habits towards food.

The food waste problem is also related to food scarcity and food security in the definition of how food can be safely got onto someone's plate, including the nutrition and the needs of that food, most importantly for the reason of a safer and healthier

life. The terms also explain how the demands can be met with the supplies, so food security in conclusion is how the global demands of food can be met with the supplies that the world has. This topic discovers food and natural resources for the present time but also for future generations.

#### **1.2 OBJECTIVES**

To address this issue, this research aims to provide a general overview of the food waste situation globally and specifically in Indonesia. This research aims to gain more insight, therefore this study provides specific objectives, including :

- 1. To asses current food waste levels in Indonesia by determining the amount and types of food waste in Indonesian households.
- 2. To identify contributing factors by investigating the main reasons behind household food waste, considering lifestyle, cultural practices, and consumption behaviors.
- To analyze technological solutions by examining how technology can influence food waste reduction habits among Indonesian families.
- 4. To develop a comprehensive strategy framework by creating a strategic framework that integrates behavioral, technological, and policy-based approaches for effective food waste reduction at the household level.
- 5. To develop practical guidelines by creating actionable recommendations for households to adopt more sustainable food consumption practices.

#### **1.3 SIGNIFICANT OF THE STUDY**

The significance of the study is to contribute to the communities in multiple areas of disciplines. It aims to also create strategies to reduce or limit the level of food waste and therefore can also provide insightful information for the future potential growth of more developed research and better strategies to address the issue provided in this study. In conclusion, this thesis underscores the urgency of addressing food waste in Indonesian households within the broader framework of global sustainability goals. By examining strategic approaches to reduce household food waste, this research seeks to pave the way for tangible improvements in the management of food resources, ultimately contributing to a more sustainable and resilient food system.

#### **CHAPTER 2**

#### **2.1 LITERATURE REVIEW**

Food is something beyond what people eat and consume on a daily basis, often time, food can be very attached to cultures, values, and social norms in a society. Behind it all, there are big areas that also get affected, such as the economy, society, environment, politics, technology, and legal. Even more in a big perspective, food can be connected with the supply chain and the value of food in a food chain, how food affects the hospitality industry, the behavior or economic situation of the working class and non-working class can affect the behavior of consuming food in a daily basis and many more.

#### **2.2 FOOD WASTE DEFINITION**

Food waste is an unresolved problem for the developed world economies and is slowly creeping into the growing (Bhatia & Sharma, 2023). Food waste is a pressing issue in developed economies due to consumer habits and inefficiencies in the supply chain. This problem is gradually emerging in growing economies as they adopt similar consumption patterns and face challenges related to urbanization and changing lifestyles. Both face issues of overproduction, inadequate distribution, and wasteful consumption. Addressing food waste demands a comprehensive approach involving education, innovation, efficient supply chain management, and policy changes to reduce waste and optimize resource use, benefiting both developed and growing economies.

Different definitions of food waste encompass various aspects: Food waste refers to discarded food and its inedible parts, such as bones or fruit cores, occurring at every stage in the food supply chain, spanning from the farm to the consumer's table. While waste occurs across these stages, the greatest portion materializes during consumption, making it a primary target for food waste prevention efforts. Notably, a recent EU-wide study employing a common methodology revealed that in the European Union, approximately 53% of food waste is generated in households, 7% in wholesale and retail, and 9% in restaurants and food services. Additional contributors to food waste include primary production at 11% and food processing and manufacturing at 20% (European Commission).

#### 2.2.1 Food Waste and Food Loss

Food waste occurs at every stage of the production cycle, from the farm to distribution and retail to the consumer. Reasons for this waste include issues like mold, pest damage, poor climate control, cooking losses, and intentional disposal of food. The distinctions in this waste are as follows:

- "Food loss" happens before reaching the consumer due to problems in production, storage, processing, and distribution.
- "Food waste" refers to edible food consciously discarded at the retail or consumer levels (Avenue et al., 2017).

Various factors contribute to food waste within households. These factors encompass consumer behavior and shopping tendencies, often influenced by varied food preferences and impulsive buying habits. Consumers may purchase items they don't necessarily need due to factors like eye shopping or influenced by sales or discounts. Ineffective food management plans are also significant; inadequate planning leads to unused food, which eventually falls into the food waste category. The aesthetic factor is another contributor, where changes in the appearance of fruits or vegetables might lead to their disposal, despite their edibility. Overall, the lack of knowledge and awareness regarding food usage and preservation is a pivotal factor influencing household food waste.

Food waste has profound implications for the environment, economy, and society. Environmentally, it contributes significantly to greenhouse gas emissions, accounting for approximately 252 million tonnes of CO2 equivalents, making up about 16% of the EU's food system emissions. If measured independently, food waste would be the fifth largest greenhouse gas emitter. Wasting food also strains limited natural resources such as land and water (European Commission).

Economically, food waste affects resource allocation within a country. When waste occurs in the food production process, it means a loss of resources that could have been utilized elsewhere. Budget allocations intended for food production get diverted due to this wastage. Socially, food waste raises ethical concerns. Global food systems depend on a sharing model where surplus areas provide and deficit areas receive.

When food is wasted, issues like hunger and malnutrition arise in society. Often, the entire food system's workflow is not fully visible, and without awareness, people may not consider these issues when dealing with food waste.

Minimizing and preventing food waste can have far-reaching benefits. It can enhance food security, improve productivity and economic efficiency, facilitate resource and energy conservation, and contribute to addressing climate change. Additionally, by reducing food waste, the impact of climate change-related disruptions in the supply chain can also be mitigated (Food Waste and Its Links to Greenhouse Gases and Climate Change, n.d.).

#### 2.2.2 Food Waste in Indonesia

#### Figure 1. The Non-Recyclable Waste Rate in Indonesia



Note: Source: Bappenas (Citation2021)

(Waluyo & Kharisma, 2023)

In 2019, according to data from Bappenas, the Ministry of National Development Planning of the Republic of Indonesia, food waste, particularly in the non-recyclable waste category, was recorded at 57.4 million tons, marking the highest volume. Projections indicate a staggering 54% increase in food waste by 2030, signaling a concerning and rapid surge within just an 11-year period.

This dramatic increase raises significant concerns given the expected rapid population growth, the subsequent amplified food demand, and the processing needs. These trends pose a considerable long-term challenge for achieving sustainable development goals. From a global perspective, reducing, minimizing, and eliminating food waste has become a collective objective. This goal is particularly crucial for countries such as Indonesia, given their substantial population. Addressing this issue is vital for efficient resource management, ensuring sustainability amidst growing demands and challenges in food security and waste management.

## **2.3 THE EXISTING STRATEGIES TO REDUCE FOOD WASTE IN HOUSEHOLD**

#### **2.3.1 Behavioral Interventions**

Cognitive psychology suggests that attitude plays a pivotal role in guiding human behavior (Bredahl, 2001). Attitude, as defined by Soorani and Ahmadvand (2019), refers to an individual's favorable or unfavorable assessment of a particular behavior. Recent studies have explored cognitive (Cos,kun and Ozbük, "2020), emotional (Szakos et al., 2021), and attitudinal factors within the context of household food waste (Principato et al., 2020).

Moreover, empirical research on sustainable consumption has revealed a significant link between a positive attitude toward sustainable products and the adoption of sustainable consumption practices (Park and Lin, 2018). Individuals exhibiting more favorable attitudes toward the environment are likely to prioritize eco-social benefits and show greater concern for environmental issues. These favorable environmental attitudes might also prompt individuals to replace non-environmentally friendly purchases with more environmentally conscious ones (Cheung and To, 2019).

Various studies have shown a strong association between environmental attitudes and intentions to make environmentally friendly purchases (Patel et al., 2020; Habib et al., 2023). This association underscores the influence of attitudes on consumer behavior, particularly in encouraging environmentally conscious purchasing decisions. Those who realize and are aware of the impact of food waste will create a system on their lifestyle to address the issue, having sustainable plan practices such as a better food

storage system and portion control, with that, it is shown that these interventions can be effectively reducing household food waste and putting the most aim to mindful consumption and behavioral change. The main idea of behavioral interventions is how people are mindful about how food is purchased, stored, and consumed. In connection to that, programs like campaign and social-media influence has been some of the strategies that organizations and governments used for a long time, it is also a core that affect bigger change because it started from one individual and spread globally.

The United Nations General Assembly established the International Day of Awareness of Food Loss and Waste (IDAFLW) on September 29. Co-led by the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Programme (UNEP), both organizations collaborate to spearhead the activities and initiatives on this significant day.

IDAFLW aims to increase global consciousness about the pressing issue of food loss and waste. It strives to spotlight potential solutions at all levels and encourage unified efforts to achieve Sustainable Development Goal Target 12.3. This target aims to cut per capita global food waste by 50% by 2030, particularly at the retail and consumer levels. It also emphasizes the reduction of food losses throughout the entire food production and supply chains (International Day of Awareness of Food Loss and Waste, n.d.).

In the EU, campaign posters were created to promote the issue and build awareness about food waste :



#### Figures 2 and 3. Food Loss and Food Waste Posters

Source: European Commission on International Day of Awareness of Food Loss and Waste.



Figure 4. Structure for Comprehending Food Waste Reduction Practices

Source: J. Kim et al. / Journal of Cleaner Production 243 (2020)

#### 118608 ( (Kim et al., 2020).

Kim in their paper explains how different targets of the audiences for the campaign affect their behaviors, as the figure above shows that there are 3 main ways humans can choose to change their behavior toward food waste, Reduce, Reuse, and Recycle, instead of just going to disposing. That figure shows what an individual can do to be more engaged in a sustainable lifestyle or simply what strategy to use towards different types of food waste.

#### 2.3.2 Technological Solutions

Technology is one of the keys to keeping up with the current trends, and the development of the world is also one of the sources of innovations created. In Richard S. Hand's book, talking about Strategic Leadership (Managing The Missing Links), Richard S. Hand says in his book that technology is one of the missing links. The availability of the development of technologies created massive opportunities, not only for business but also in any other sector related to strategic planning. It is the missing links that involve technologies in any strategy because while planning and monitoring strategic development, technologies provide tools that help faster and better.

Technological solutions leverage advancements in smart appliances and mobile applications to assist households in managing their food inventory more efficiently. Smart refrigerators, for instance, can track food freshness and provide expiration alerts. Food waste reduction apps help users plan meals, track inventory, and receive recipe suggestions based on available ingredients. These technologies offer convenience and real-time information, empowering consumers to make informed decisions regarding their food consumption, thereby reducing waste.

Nowadays, more and more companies and start-ups using technologies for the purpose of finding new ideas and solutions for many global concerns, including food waste. Several start-ups create tools and also work together with several stakeholders to identify strategies to reduce food waste, such as "*Too Good To Go*" works with several restaurants, groceries, and even hotels in some countries in Europe to sell discounted foods to prevent the food from going to the trash.

#### 2.3.3 Policy and Regulatory Measures

Governments and regulatory bodies have implemented various policies aimed at reducing food waste. Some countries have introduced regulations related to date labeling, ensuring that consumers have accurate information about the freshness and safety of food products. Additionally, tax incentives and legal frameworks have been established to encourage food donation by retailers and producers, diverting surplus food to charitable organizations rather than disposing of it. These policy measures provide valuable insights into the potential impact of government intervention in curbing food waste.

The role of government is vital for the overview of food waste because the government's regulations will give the standards on each particular food and how it will be regulated, from the public to the smallest area of the household, making sure that the safety and health aspects are provided.

#### 2.4 FOOD WASTE IN INDONESIA

Food waste in Indonesia itself is related to the general definitions where food waste often comes from a surplus of foods, the behavior towards consumption, which can include how people consume the food and how their behavior of purchasing the amount of the foods which are not consumed and it is either turn bad organically or it is unconsumable due to its expiration date.

Indonesia's food consumption patterns are rapidly evolving due to urbanization and shifting lifestyles (FAO, 2017). The shift in dietary preferences and changes in the way food is purchased have the potential to affect the generation of food waste. Moreover, cultural customs, such as communal dining and traditional food preservation methods, play a significant role in how food resources are handled within Indonesian households. The choices people make regarding what they eat not only impact their well-being but also have a unique impact on households with limited income, where a significant portion of the food budget is allocated to carbohydrate-rich foods. Indonesians consume various foods, with the concept of 4 health and 5 perfect, which include carbohydrates, protein, fruits and vegetables, fat, and dairy.

In Indonesia, an extensive micro-research initiative involving samples from five major cities was carried out (Seda, Setyawati, Tirta, & Nobel, 2020). The findings highlighted the influence of religious and cultural values on the local community's consumption patterns. Analyzing household microdata, the study explored detailed factors affecting consumption, such as education levels, marital status, employment, and household size (Rasyid et al., 2020).

Rice serves as the primary food for a majority of Indonesians, typically consumed three times a day. Consumption quantities are influenced by multiple factors mentioned earlier, with economic status playing a prominent role. Higher-income individuals tend to have greater purchasing power compared to those with lower incomes.

#### 2.4.1 Cultural and Societal Factors Influencing Food Waste in Indonesia

Indonesia is one of the countries that have a very strong community and cultural influence on individual behaviors and actions, when it comes to food, it is usually connected to values, cultures, religions, and norms. One of the cultures related to food in Indonesia is sharing culture, it is considered unpolite if you have food and do not share it with your close ones, for example, you are currently eating and your friend is in front of you and not offering that can be perceived as you are not willing to share. In connection with food waste, oftentimes time this culture can also lead to food waste, when Indonesian families cook, it is most likely to be shared with family and neighbors, the leftovers or the overcooked amounts are the waste that resulted from that activity.

Other main influences that also have a big impact related to food waste are packaging and the use of plastics. One of the main concerns that come along is the pollution it causes because of plastic use. Packaging usually uses single-use plastic packaging that easily goes bad due to several factors which result in poor storing and packaging of the foods which also results in spoiled and wasted. On top of it, there is a lack of awareness of the people.

Socioeconomic factors also play an important role in food waste. In wealthier households, there may be less incentive to minimize waste, while in poorer households, food may be wasted due to insufficient resources for proper storage and preservation. Income inequality may result in buying power, for a family with the highest income, they are more likely to spend more. Another consideration factor is the changing habits and lifestyles in the urban area, people are eating out more, either in restaurants or cafes which can have a large number of portions as well, that amount if not consumed will lead to food waste and also in connection with income inequality, a wealthier household in an urban area also involved in that activities.

Indonesia is one of the countries that have a highly populated number of people also rich in cultures and traditions, one of them is religious and cultural festivals that involve of preparation of large amounts of food which also contribute to the significant amount of food wasted, especially if the food is not manageable due to the process of distribution and stored, those food will be just ended up in the trash instead of making its way to those who are in need.

#### 2.4.2 Existing Initiatives and Challenges Specific to Indonesia

To build awareness and care of the issue, governments and several organizations in Indonesia already made several campaigns related to the issue of food waste. The campaign especially addresses how individuals have power over what they consume and the level of consumption detailed in household areas, with building responsible consumption being the main goal of these campaigns.

With these issues spreading globally, some Non-Profit Organizations and food banks are also involved in bringing initiatives to support tackle the issue by working closely with restaurants, hotels, and supermarkets to distribute and manage the surplus of foods to those who are in need and cannot afford food in general basis. Not only that, but some start-ups also take part in this issue by creating platforms and tools with technology basis and working on reducing prices of the foods to be more affordable and not going to waste from the grocery shops, restaurants, and hotels. With the awareness build, some restaurants and hotels trying to improve their systems as well with proper training to improve their inventory system, storage, and portion control.

However, the existing strategies to reduce food waste come with several challenges, such as infrastructure challenges. Indonesia is a country with over 17,000 islands that are separated by water, often time, pieces of information are not distributed evenly due to the infrastructure and lack of facilities. In rural areas, it is very different how cultures, behaviors, values, and even technicalities of managing food, it is often lack of proper transportation, distribution, and storage leads to food spoiled and being wasted faster, also Indonesia's tropical climate can exacerbate food spoilage and reduce the shelf life of certain foods, increasing the likelihood of waste.

The role of government is also very crucial since all the regulations and policies are controlled by them, it is important to address this issue with specific regulations and policies, not only to encourage businesses to take action towards the issue but also for the individual since the biggest food waste came from the household area. Combating the issue not only involving several people but also every aspect and element of the countries, knowledge of each household needs to be improved, especially with the economic discrepancy. During this era, the emphasis on collaboration and innovation is critical. To involve more individuals, governments, and organizations, synergy is essential. Effectively addressing food waste in Indonesia requires a multifaceted approach. Efforts should concentrate on a blend of education, infrastructure enhancement, policy development, and community engagement. Tailored solutions that consider the distinct cultural and environmental aspects of various regions in Indonesia will play a vital role in combating food waste.

#### **CHAPTER 3**

#### **3.1 MATERIAL AND METHODOLOGY**

This section outlines the framework and methodology employed to conduct this research, detailing the systematic approach and tools utilized to address the objectives of the study. The section encompasses a detailed description of the materials, experimental setup, data collection methods, and analytical techniques utilized in this investigation. By adhering to a standardized methodology, this study ensures reproducibility and transparency in the research process, allowing for the validation of results and facilitating future investigations. This section serves as a blueprint, offering a clear understanding of the procedures implemented and the accuracy of the outcomes presented.

#### **3.2 DATA SOURCES AND MATERIALS**

#### 3.2.1 Secondary Data Sources

This research collects data both quantitative and qualitative to get in-depth knowledge of the topic or issue to address. Secondary data sources were collected from previous research that studied and shared knowledge about the topic. Quantitative data are from government resources, academic studies, and databases from non-governments (NGOs). This data provides statistical insights into food waste trends, socio-economic factors, environmental knowledge, and policy effectiveness in Indonesia. Qualitative data are from reports, academic articles, journals, interviews, and textual sources. These data provide a deep understanding of the concept and insight including behavioral, cultural, attitude, and initiatives related to food waste in household areas in Indonesia.

The key to secondary data analysis is to apply theoretical knowledge and conceptual skills to utilize existing data to address the research questions (Johnston, 2014). It is very important to consider what knowledge researchers developed previously to explore more factors that can be developed with other research. One might argue that previous data only develop one way of thinking, however, that data is to provide concepts, background knowledge and previously discovered thinking from other

research. Secondary data also called data available or existing data that previous researchers wrote, is often time used for developing existing theories or developing and exploring new perspectives with different research purposes and objectives. Secondary data analysis means using data previously collected. Collecting data for social science research is often costly and not easily repeatable. Hence, making use of pre-existing data or materials, where possible (e.g., utilizing data archives), is a practical and beneficial approach (Bacon-Shone, 2013).

#### 3.2.2 Case Study

Case studies provide depth information and understanding about the related topic and complex approaches in real-life contexts. It mostly relies on qualitative data which some researchers might find it controversial method, but this research will provide several knowledge and theories that will be analyzed rationally. The selection of case study for this research will be selected to represent the diverse geographical regions, cultural contexts, and socio-economical backgrounds within Indonesia and also include behaviors and factors.

Qualitative data which case studies relied on provided rich insight, descriptive, and comprehensive, including narratives, observations, and interviews. The qualitative paradigm is arguably more concerned with context than counts and provides richness not easily achieved with quantitative measures (Bacon-Shone, 2013). High-quality qualitative research employs a methodical and rigorous approach, seeking to address inquiries regarding the nature of something (like a patient's experience), understanding people's thoughts or feelings about events, and exploring reasons behind why certain occurrences have transpired in a particular way. Some of the characteristics of a case study, including :

1. Specification is focusing on a single case that explores the details and the complexion of that single case, to dig deeper into the related issue which can be from a person, an institution, or any other analysis unit, this allows an author to have a perspective on a single yet full of details of a case.

2. In-depth Exploration is used to collect a variety of data which can include observations, documents, and interviews. This approach covers a wide range of scope of the case to have a better understanding of the issue addressed.

3. Contextualization emphasizes more about the context of the issue which uses existing cases to have a better and broader understanding, such as cultural, historical, and social factors that may influence the topic of the research.

4. Longitudinal and Holistic: Case studies develop over time and change over an extended period, allowing researchers to keep updated and also understand the whole variables, not only the individual and the connections between factors that are involved.

5. Multiple Data Sources: Researchers collect data from multiple sources to ensure the reliability and validity of their findings. Triangulation, or the use of multiple data points to corroborate findings, is common.

6. Generalization: While case studies are typically specific and context-dependent, they can sometimes lead to findings that have broader applicability. This is known as "analytical generalization" or "transferability," where insights from the case study can inform similar situations.

#### **3.3. DATA ANALYSIS TECHNIQUES**

#### 3.3.1 Secondary Data Analysis

1. Quantitative Data Analysis: Quantitative data is usually analyzed by knowing the relationship between the variable's values in terms of their numerical and or statistical. The level of quantitative includes: a) Descriptive analysis describes sample vs. population but lacks depth. b) Explanatory analysis seeks to understand why things happen but may have alternative explanations. c) Predictive analysis aims to model future outcomes, dependent on data quality and model choice (Bacon-Shone, 2013). Descriptive statistics, regression analysis, and other appropriate techniques will be employed to examine trends, relationships, and variations in food waste behaviors and the factors influencing them.

2. Qualitative Data Analysis: Qualitative research is an inquiry process of understanding based on a methodological tradition of inquiry that explores a problem, which enables construction of a complex, holistic picture, analyses words, reports detailed views of informants and conducts the study in a natural setting (Bacon-Shone,

2013). Qualitative secondary data will be subjected to thematic analysis and content analysis. This approach involves identifying recurring themes, patterns, and narratives within the qualitative data, enriching the understanding of cultural influences and attitudes toward food waste.

Sometimes, the differentiation between qualitative and quantitative research hinges on the data types collected: directly measurable data (quantitative) versus recordable data like text, audio, or video (qualitative) (Bacon-Shone, 2013).

#### 3.3.2 Case Study Analysis

The Case studies provide thematical and structural thinking, the case will be thematically analyzed to identify key themes, patterns, and narratives related to food waste behaviors. Case study types include: a). Exploratory, which is designed to gain insights into a particular topic and lay the groundwork for future research, b). Descriptive, which provides a detailed account of a single case, often without attempting to generalize findings, c). The explanatory aspect of research seeks to comprehend the reasons behind why events unfold as they do, determining the reliability of this comprehension, and considering alternative explanations. On the other hand, d). the predictive element aims to develop models for anticipating future outcomes and assessing the accuracy of these predictions (Bacon-Shone, 2013)., and e). Intrinsic, which focuses on the interest, rather than exploring. In this study, the focus of the case will be using explanatory to gain knowledge in-depth of why and how specific strategies have been effective ( or not ) in reducing food waste in Indonesian households, it will be focusing on one specific case that represents the diversity in Indonesia and also focus on the factors of the successes or the failure. This case study provides the context of food waste in Indonesia in more detail.

#### **3.4. RESEARCH SCOPE AND LIMITATIONS**

This thesis aims to investigate strategic approaches to reducing food waste at the household level in Indonesia. The primary objective is to identify effective solutions that can mitigate food waste, thereby contributing to improved sustainability and food security. The study focuses on urban households. By examining behavioral interventions, technological solutions, policy measures, and community-based initiatives, this research seeks to provide actionable insights for policymakers, practitioners, and communities to address the pervasive issue of food waste. This research acknowledges several limitations. Including strengths and weaknesses of secondary data and case studies. Secondary data, while offering various advantages, presents certain challenges in research endeavors. Its strengths lie in cost and time efficiency, access to extensive and diverse datasets, facilitating longitudinal and historical analyses, as well as cross-cultural studies. However, it comes with weaknesses, including concerns about quality and reliability, limited control over data collection processes, restricted access, potential lack of contextual understanding, issues of data completeness, and potential biases reflecting the perspectives of the original researchers. Meanwhile, case studies offer numerous strengths as a research method, providing rich, detailed, and contextually comprehensive data. They allow for a holistic understanding of complex phenomena, particularly in scenarios where little prior knowledge exists. Case studies contribute to theory development and can offer valuable exploratory insights, especially in applied research. However, they come with notable weaknesses. Despite these challenges, for the study on Strategy Approaches to Reducing Food Waste in Household Areas in Indonesia, the choice of secondary data and case study methods is well-considered due to their alignment with the research objectives, providing in-depth insights, and addressing the complexities of the topic, while also being mindful of potential biases and resource intensiveness. These include potential biases and inaccuracies in secondary data, the context-specific nature of case study findings, and the challenges associated with generalizing qualitative insights. Efforts will be made to address these limitations and provide a well-rounded interpretation of the research results.

#### **3.5. ETHICAL CONSIDERATIONS**

Ethical considerations are paramount throughout this research. Proper citation and attribution will be ensured for secondary data sources, respecting the intellectual property of original data creators and researchers. For case studies, informed consent will be obtained from participating households, and their identities will be protected through pseudonyms or anonymization to maintain strict confidentiality. All ethical guidelines and protocols set forth by relevant research ethics committees will be strictly adhered to.

#### **CHAPTER 4**

#### 4.1 DATA FINDING, DISCUSSION, AND RESULT

In this section, data is collected through systematic and logical thinking to create solutions to the topic. This section delves into the key findings derived from the implemented methodologies, providing insights into the effectiveness of various strategies in addressing the targeted issue of food waste reduction. The results are an amalgamation of both qualitative and quantitative analyses, revealing critical trends, outcomes, and discoveries pertinent to the research objectives. These findings stem from a comprehensive evaluation of secondary data and case study methods, offering in-depth insights into the complexities and nuances of household food waste management in Indonesian contexts. Furthermore, this segment acknowledges unexpected discoveries and identifies potential areas for further exploration, contributing to the broader discourse on sustainable waste management practices within household settings in Indonesia.

#### **4.2 DATA RESULT**

#### 4.2.1 Food Waste Globally, Asia, and in Indonesia

	Global average food waste (kg/capita/year)*	2019 total (million tonnes)
Household	74	569
Food service	32	244
Retail	15	118
Total	121	931

#### Table 2. Estimates of Global Food Waste by Sector

#### Source: UNEP Food Waste Index Report 2021.

According to UNEP's data on global food waste in 2019 across three sectors— Household, Food Service, and Retail—the total waste amounted to 931 million tonnes. Household waste made the largest contribution, accounting for 61% of the total, followed by Food Service at 26% and Retail at 13%.

## Table 3. Estimates of Domestic Food Waste for Every Country (Based onMeasured Data Points or Extrapolation)

M49 code <sup>1</sup>	Country	Household food waste estimate (kg/capita/year)	Household food waste estimate (tonnes/year)	Confidence in estimate
96	Brunei Darussalam	80	34 742	Very low confidence
116	Cambodia	86	1 423 397	Very low confidence
360	Indonesia	77	20 938 252	Medium confidence
418	Lao People's Dem. Rep.	86	618 994	Very low confidence
458	Malaysia	91	2 921 577	Medium confidence
104	Myanmar	86	4 666 125	Very low confidence
608	Philippines	86	9 334 477	Very low confidence
702	Singapore	80	465 385	Very low confidence
764	Thailand	79	5 478 532	Very low confidence
626	Timor-Leste	86	111 643	Very low confidence
704	Viet Nam	76	7 346 717	Medium confidence

#### Region South-eastern Asia

Another data that was revealed from UNEP, especially for Indonesia is that among the countries in the South-Eastern Asia region, Indonesia is one of the countries that have medium confidence in the estimated food waste amount. Among the countries, Indonesia is the highest which is 20.938.252 tonnes/ year.



Figure 5. Main Findings of Food Loss & Waste in Indonesia

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

Source: UNEP Food Waste Index Report 2021.

FLW generation in Indonesia in 2000 - 2019 has reached 115-184 kg/capita/year. Based on the food supply chain, the biggest generation occurs in the consumption stage. Based on the food sector and types, the biggest generation is found in crops, particularly cereals. Meanwhile, the most inefficient food sector and category is horticulture plants, especially vegetables (Ministry of National Development Planning of the Republic of Indonesia. (2021).

### Figure 6. Food Loss and Waste Production in Indonesia by Food Supply Chain Stage from 2000 to 2019 (in thousand tons)



Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

From 2000 to 2019, Indonesia's Food Waste and Loss varied, estimated between 23 to 48 million tons annually, roughly equating to 115 to 184 kilograms per capita per year. Throughout the five stages of the food supply chain, the consumption stage, particularly in households, was identified as the primary area where the most food waste occurred.



Figure 7. Percentage of Food Loss (FL) and Food Waste (FW) Generation to Total FLW in 2000-2019

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

The percentage of food loss in 20 years shows a decline, from 61% in 2000 to 45% in 2019, with an average of 56%. Conversely, the percentage of food waste generation in 20 years increased, from 39% in 2000 to 55% in 2019, with an average of 44% ( Ministry of National Development Planning of the Republic of Indonesia. (2021).

#### 4.2.2 Food Waste Categories

Figure 8. Community Behavior on Food Waste Generation, (a) Leftover Food Presence (b) Type of Leftover Food in Households, (c) Type of Leftover Food in Non-Households





Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

The results from our FLW (Food Loss and Waste) calculations match up with what we found in the questionnaire, as shown in Figure 7. What we discovered is that, when it comes to food at home, 53% of the people we asked said they usually end up with some leftover food after cooking or eating something they bought. Additionally, 51% mentioned that there's often food left on their plates after they've finished eating. Interestingly, when people eat out, the story changes. About 63% of the folks we talked to said that most of the time, they finish all the food on their plates when dining at a restaurant. However, there's a common thread both for eating at home and eating out: people tend to have leftovers from the carbohydrate category, like rice, potatoes, or corn. This is the type of food that often goes uneaten or gets wasted.

### Figure 9. Community Behavior on Handling Leftover Food in Household, (a) Leftover From A Shared Meal (Buffet), (b) Leftover Food in Individual Plates



Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

Community behaviors can reflect on the way that they handle or manage food waste, the above figure from the survey shows that most Indonesians either throw away their food waste or give it to their pets.

The data from the Ministry of National Development Planning of the Republic of Indonesia found out when people get rid of their leftover food, in different ways during our field survey in three cities. In many local households, the mixed waste, including food waste, is collected by waste collectors and taken to a Temporary Disposal Site (TPS) or a landfill (TPA). But not everyone subscribes to these collection services, so some people give their food scraps to their pets, save them, and later burn them in their backyards. On the other side, some households are pretty good at separating their waste, and there are special food waste treatment activities at certain TPS locations.

#### **4.2.3 Food Waste Factors**

behavior



#### **Figure 10. Factors and Policies**

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

Causes and Drivers of FLW in Indonesia					
Туре	Very Important	Туре	Medaretely Important		
D	Lack of implementation of Good Handling Practice (GHP)	I	Market price		
D	Insufficient quality of the storage space	1	Inefficient supply chain		
Ĩ.	Market quality standards and consumer preferences	D	Misinterpretation of expiry date and best before		
I	Lack of information/education for food workers and consumers	D	Inadequate food preparation		
D	Excess food portion and consumers behavior	1	Lack of food waste regulation		
D	Technology limitations	)	Limited access to capital		
1	Market competition and limited consumer purchasing power	D	Poor harvesting time		
D	Poor harvesting techniques	D	Overproduction		
1	Limited access to infrastructure				
D	Poor quality of packaging/container				

#### Table 4. Causes and Drivers of FLW in Indonesia

Information: D = Direct causes I = Indirect drivers

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

The figure above stated 10 direct causes and 8 indirect drivers of food loss and waste (FLW) in Indonesia. According to the Food and Agriculture Organization (FAO), factors contributing to FLW can be categorized as direct causes and indirect drivers. The direct cause refers to actions within the food supply chain carried out by specific actors that directly result in FLW. In contrast, the indirect driver relates to broader systemic factors within the food system, encompassing economic, cultural, and political conditions that impact the operations of actors in the food supply chain and, consequently, influence FLW generation.

These findings were derived from the analysis of results obtained from focus group discussions, expert interviews, and practitioner interviews. Using a combination of weighting and the Pareto Method to evaluate and prioritize these factors. Among the 18 identified causes and drivers, 10 were rated as "Very Important," as shown in Table 4.

#### **4.2.4 Food Waste Effects**

1,000

0

2002 2003

Food waste not only affects the environmental situation of a country, but also economically, socially, and even from a health perspective.



Figure 11. Greenhouse Gas Emission per 1 ton FW, and 1 ton of FLW

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

-Food Loss

-Food Waste

2008 2009 2010 Year

Food Loss and Waste

Figure 16 shows how important-greenhouse gas (GHG) emissions are caused by different stages of food loss and waste (FLW) in Indonesia from 2000 to 2019. It shows us that, on average, for every ton of FLW over 20 years, about 2,324.24 kilograms of carbon dioxide equivalent (kg CO2-eq.) are produced.

In the graph, we also see that when we look at 1 ton of food waste (FW), it's a big deal for the environment, causing around 4,051.5 kg CO2-eq., which is about 4.3 times more than 1 ton of food loss (FL), which is responsible for roughly 943.29 kg CO2-eq. The reason for this difference is that as food waste moves along the supply chain, it picks up emissions from earlier stages, making it much worse for the environment.

What's interesting is that if food waste happens at the end of the supply chain (like at the consumption stage), it's way worse for the environment—4.3 times worse— compared to food loss happening earlier in the chain (like during production). So, if we reduce food waste at the end of the line (when we're about to eat it), we can help the environment by reducing these emissions.



Figure 12. Contribution of GHG Emission Source in 2019

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

In 2019, out of a total greenhouse gas (GHG) emission of 139.97 million tons of CO2 equivalent (Mton CO2-eq), from the figure above we found out that the most contributions are from consumption which is a household area, 31.6%, and then production for 28.8%, and the rest are from post-harvest & storage, distribution & market, also processing & packaging.



Figure 13. The Contribution of 5 Supply Chains Stages in GHG Emission per Year

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

The figure above shows that the total food loss and waste (FLW) generated over 20 years adds up to about 1,702.9 million tons of carbon dioxide equivalent (Mton CO2-eq), with an average of roughly 85.14 Mton CO2-eq per year. To put that in perspective, this is equivalent to covering an area as big as Java and NTB with trees. The consumption stage is the main contributor to emissions compared to other stages, accounting for an average annual emission of about 49.34 Mton CO2-eq, which makes up around 57.95% of all stages. The environmental impact of FLW generation at the consumption stage doesn't just encompass emissions produced during consumption; it also includes the potential impacts of the entire preceding supply chain.



Figure 14. Economic Loss due to FLW in 2000-2019 (in Trillion Rupiah)

Source: Ministry of National Development Planning of the Republic of Indonesia. (2021).

Looking at the money lost, as seen in Figure 19, the biggest economic hit happens during the food waste (FW) stage, ranging from 107 to 346 trillion rupiah every year. This matches up with the amount of food loss and waste (FLW) we see during the FW stage compared to the FL stage. The years 2017 to 2019 stand out as the time when we lost the most money due to FLW.

#### 4.3 CASE STUDY

Studying household waste generation and its components to enhance Indonesia's Solid Waste Bank Program: A case study focusing on Medan City.

#### **4.3.1 Introduction and Background :**

This study case focused on one of the big cities in Indonesia, which is Medan, the 3rd largest city following Jakarta, and Surabaya, the relevance of this study to this research is that this study learns in depth about the strategy to minimize food waste according to the policies, and one of them is to improve the recycling system through food waste bank program, this study cas created by Hafizhul Khair, Indriyani Rachman, Toru Matsumoto, Received: 27 March 2018, Accepted: 24 January 2019, and Published online: 11 February 2019 through Springer.

The solid waste management activities in Indonesia consist of its collection, transfer and transportation, and final disposal. Indonesia's Ministry of Environment formulated a legal framework for solid waste, outlined in the Waste Management Law No. 18/2008. This law mandates compliance from local governments and stakeholders concerning waste disposal regulations, and it includes provisions for closing noncompliant disposal sites (Khair et al., 2019).

Governments say that they already covered around 80% of areas in which the wastes are collected daily and dumped into landfills, but it is also undeniable that some areas and households also not participating in this service due to economic reasons which they cannot afford or do not want to afford results in the wastes ended up in the environments, like rivers, empty lands, etc. The services that governments provided using trucks to pick up the wastes door to door ended up in final landfills without any separation or categorizing of the wastes, however for the suburbs area, the governments usually provided containers, and from that it will go to the final landfills as shows in figure 21.

Figure 15. Existing Waste Management Flow System in Medan



Source: (Khair et al., 2019)

Currently, the problem of solid waste collection is defined by low levels of service quality and weak financial sustainability. The low levels of service are indicated by the shortage of facilities and infrastructures in waste management. Without increasing revenues from solid waste management services, the municipality cannot finance improvements to service provision. At the same time, there is also low awareness of community participation and willingness to pay among residents (Khair et al., 2019).

#### 4.3.2 Study Relevance and Integration :

This study uses statistical methods with samples of 424 households in 8 of the 21 subdistricts in Medan City, Indonesia. Sample Households are classified into 3 categories, which are High-Income Households (HI), Middle-Income Households (MI), and Low-Income Households (LI). Sample households for each are 45 percent of LI, 30 percent of MI, and 25 percent of HI which are evenly distributed across the study area due to the economic conditions, also categorized into 3 groups based on the closeness to the city center, 0-5 km, 5-10 km, and last but not least more than 10 km.

The waste itself is categorized into groups of plastic, paper, organic, LWTR (leather, wood, textile, and rubber), glass, metals, inert, and miscellaneous which results in a percentage composition analyzed by their weight. This study used a survey of domestic waste by analyzing waste in each household done in April 2017, also involving secondary data that the researchers got from reports, academic papers, and other documents with the involvement of 20 university students in the process related to the waste analysis. This research aligns with the aim of my study and research, by analyzing this case, the results and the findings can contribute in so many ways, including the proportion or categories of the waste in households, amount/ level of the waste in household areas, also how effective the strategies that are already existing, therefor can be used for implementing or improving existing and new strategies which is the main idea behind this research.

4.3.3 Analysis and Discussion :



Figure 16. Comparison of Household Waste Composition in Different Locations

Source: (Khair et al., 2019)
Data from the study case shows that among 3 groups the distance from the city center, all of them show that the proportion of organic waste is the biggest waste, organic here considering food wastes, yard wastes, and leaves which accumulated 61, 35 percent then following by plastic 17.55 percent, this figures proves that also by having plastic wastes, the previous theoris of packaging in food is crucial which people in Indonesia use plastic in big amount when it comes to food packaging and storing. On top of that, it is also stated that the lowest waste belongs to the group of 5-10km because this area is dominated by residential and shopping areas which influence the lifestyle and also the behavior of eating outside.

 Table 5. The Outcome of Waste Generation Rates in Various Sub-Districts and

 Income Levels

Sub-district	Population	High income (kg/person/ day)	Middle income (kg/person/day)	Low income (kg/person/ day)	All income classes (kg/person/day)
Medan Polonia	55949	0.261	0.351	0.403	0.353
Medan area	98992	0.386	0.259	0.482	0.388
Medan Selayang	106150	0.176	0.182	0.185	0.182
Medan Helvetia	150721	0.129	0.171	0.143	0.149
Medan Tembung	137178	0.136	0.137	0.118	0.128
Medan Johor	132012	0.195	0.296	0.208	0.229
Medan Tuntungan	85613	0.213	0.223	0.331	0.267
Medan Labuhan	117472	0.206	0.238	0.251	0.235
All data					
Average		0.202	0.219	0.247	0.222
Standard deviation		0.132	0.180	0.222	0.191
Max		0.763	1.736	1.706	1.736
Min		0.053	0.045	0.027	0.027

Source: (Khair et al., 2019)

Based on the income level of the population, the average waste generation of highincome (HI), middle-income (MI), and low-income (LI) residents has almost the same value across the range. Average domestic waste generation for HI was  $0.202\pm0.132$ kg/person/day, for MI  $0.219\pm0.180$  kg/ person/day, and LI  $0.247\pm0.222$ kg/person/day. The result of the waste generation rate in different income levels is shown in Table 8 (*Khair et al., 2019*).

Strata	Day (kg/person/day)									
	1	2	3	4	5	6	7	8		
ні	0.197	0.208	0.182	0.190	0.188	0.175	0.184	0.190		
SD	0.113	0.153	0.136	0.116	0.120	0.114	0.104	0.135		
MI	0.186	0.175	0.185	0.195	0.193	0.196	0.188	0.187		
SD	0.095	0.111	0.108	0.105	0.094	0.123	0.096	0.088		
LI	0.210	0.199	0.228	0.208	0.197	0.194	0.209	0.211		
SD	0.133	0.127	0.192	0.135	0.126	0.131	0.124	0.151		

Tale 6. Waste Generation From Different Income Levels During 8 Days' Survey

SD standard deviation

#### Source: (Khair et al., 2019)

The table shows that the generating of waste did not show any significant difference each day for different groups of different income level, however other studies of another city show income level play an important role in different amount of waste, but the case of Medan city has a slightly different result, the previous table also shown the same matter.

Data that are provided from the case shows that the amount of food waste in Indonesia mostly from organic, one of the strategies that are currently developed by the government is not enough to minimize even limiting the waste because, in the long-term, governments will need more landfills to take all these wastes, therefor program like a solid waste bank is developing by the community independently not formally integrated with governments, in which people can exchange their valuable waste in return to get money, the case shows that above 50% of the have value of recycling and also composing. One of a solid waste bank in Medan called Sicanang Waste Bank, to make people engaged more they also offer free pick-up from Monday to Saturday. The research shows that Medan has a great opportunity for recycling based on the types of waste people produce on solid waste banks. This recycling potential isn't just for recycling centers but also for places that collect and sort recyclables. By combining these efforts, we can recover more valuable materials and help the environment by reducing pollution.

To manage waste effectively, we need to plan how we collect and handle it, and encourage people to separate their trash. The government can help by providing bins and facilities for this purpose. They can also make recycling more common by creating good rules. It's important to talk about waste management, reward good practices, use eco-friendly technology, and get feedback from the community. People are working together to aim for zero waste and a waste-free Indonesia by 2020.

Conclusion: Medan City generates an estimated daily household waste of approximately 0.222 kilograms per person per day. The most substantial portion of household waste is organic, accounting for 61.35% of the total weight, and plastic waste constitutes 17.55%. While there are differences in waste generation between various locations, no significant variation was observed across different income levels. Household waste contributes to about one-third of the daily waste sent to landfills. A significant proportion of household waste (61.35%) is compostable, with 28.70% being recyclable materials. The composition of household waste offers promising opportunities for solid waste bank activities. To enhance the city's waste management systems, the government should develop effective strategies, ensure the sustainability of solid waste banks, and provide both technical and non-technical support. Increasing public awareness and educating residents about waste reduction and sorting practices are crucial steps in improving waste management in Medan City.

#### 4.4 STRATEGIC PLANNING SOLUTIONS (FINDING AND DISCUSSION)

This research seeks to find solutions that are attached to the topic for improvement and a better direction. It is seeking strategic planning solutions and finding out how the strategies can be successfully introduces and implements.

## 4.4.1 Strategic Planning

Strategic planning is an important aspect in connection with the topic of reducing food waste, it is a process of strategic approaching of structure and systematic approaches for the organizations and governments to address the issue. It is a critical process to develop and implement initiatives aimed at reducing food waste in households.

#### **Figure 17. Strategic Planning Process**

StrategyStrategyStrategyFormulationDevelopmentImplementationEvaluation

Source: (Sanchez, 2012)

- Phase I: Formulation of the strategy process– vision, mission, and values developed. The Vision of the organizations and governments is all about its imagination of the future, what is the aim to be in the future, and which direction the leader wants the organizations and governments to go. The mission supports the vision which where the organizations and governments want to go and more details of what they want to do. Therefore, its value also has to be aligned with its vision and mission, because the value is the core and what it wants to give to its customers for example, what it wants to offer. In this phase, clear and specific objectives for the food waste in household area is set and provide directions to the process and clear measurement of the goals. This phase is a foundation for having a strong overview of the issue of food waste.
- Phase II: Developing the strategy process <u>SWOT Analysis</u> (internal strengths and weaknesses, external opportunities and threats). Analyzing the strategy for the organizations and governments will be able for them to know which area they need to take into consideration, both internal and external potentials have to be considered, SWOT is not the only analysis tool that organizations and governments can use to measure and develop, the organizations and governments can also use tools like BCG matrix, PESTEL analysis, and PORTER model.

In this phase, understanding the demographics, behaviors, and preferences of households becomes crucial. Identifying target audiences ensures that strategies are tailored to specific audience segments, enhancing the relevance and effectiveness of the planned interventions. Knowing the potentials and challenges that might occur while creating strategies for reducing food waste is very important, not only to make it successful but also to know how the information can spread globally.

- Phase III: Implementing the strategy process Short-term objectives established, action plans and resources allocation. After knowing where the company stands, it is now the organization and government's task to implement its strategies to action. Implementation involves the allocation of resources, including budget, personnel, and technology, which is necessary to execute the planned strategies effectively. Additionally, this phase encompasses the selection of interventions based on their potential impact and feasibility within the target population. A mix of behavioral, technological, and policy-based strategies may be required for effective implementation. In this phase, a strategy related to food waste started to be implemented.
- Phase IV: Strategy Evaluation the measurement of the strategy and reviewing process. In this phase, the organizations and governments want to review and know all the feedback on the strategies that they already applied to know if it is relevant, do they need to keep it, improve it, or change it and implement a new strategy to keep their value in the business industry. The evaluation phase is essential for assessing the progress and impact of the implemented strategies. It includes the development of mechanisms for continuous monitoring and evaluation, which are crucial for measuring the effectiveness of the strategies and identifying areas for improvement. Regular assessment allows for adjustments and enhancements to ensure the long-term success of food waste reduction initiatives.

#### 4.4.2 Internet, Social Media, and Startup in Indonesia

Technology, within the global landscape, stands as a pivotal force driving the world's revolution and development. The advent of the internet, still widely used today, has linked people globally, while the evolution of social media has facilitated even more seamless and rapid connections among individuals. However, the internet and social media have dual effects, bringing both positive and negative implications. Utilizing them in the right manner can yield various advantages, particularly in information dissemination, campaigns, and commercial purposes. Nowadays, even traditional brick-and-mortar stores have extended their reach by establishing online platforms to expedite the promotion of their products and services.

In Indonesia, the internet and social media serve several purposes. The emergence of "influencers" has become a prevailing trend. These individuals typically leverage their social media presence to endorse products or services, significantly impacting the purchasing decisions of their followers.



Figure 18. Countries With The Biggest Share of Internet Users in Asia As of July 2022, By Countr

Source: Asia: distribution of internet users by country 2022 by Statista. The figure above shows that Indonesia is the third country in Asia that has the biggest share of Internet users besides India and China, which makes Indonesia have a high traffic of Internet and sharing information. This data from Statistica shows several

indications about Indonesia. The biggest share of the internet can indicate several

1. Large access to the internet can mean large access to several sources of information that can be used for educational purposes which is very beneficial for skills development and educational purposes.

positive points, including :

- 2. High internet users often time also relate to a more complex, advanced, and diversified economy. It can be an indication that the country is open to developing and embracing technology, innovation, and digital entrepreneurship, which can impact economic growth through online services, tech-based businesses, and e-commerce.
- 3. High internet usage also has an impact on global and local connectivity which leads to higher interaction connectivity, also impacted by media and information consumption, for example, nowadays there are several media online that people use to read about what is happening in the world, which also stimulates the openness of

innovation, entrepreneurship, and digital startups within the country. Indicating a thriving technology ecosystem and digital business opportunities.



Figure 19. Indonesia's Internet user count from 2015 to 2025

Source: Number of internet users in Indonesia (2020), Statistica.

The figure above shows how the number of internet users in Indonesia keep increasing until expected in 2025 which is double the amount from 2015.



Figure 20. Chart 6: The Share of Youths (%) in Each ASEAN Country Who Aspire to be An Entrepreneur (To Work For Themselves) in The Future

Source: World Economic Forum

The figure above shows that more than one-third of the country's young people, between the ages of 15 and 35, want to work for themselves. Considering Indonesia's recent success with numerous booming tech unicorns, which are start-ups valued at \$1 billion, it's not unexpected that these achievements are inspiring the country's youth, as revealed in a study (In Indonesia, over a Third of Young People Want to Be Entrepreneurs, 2019).In connection with the previous figure, it shows that Indonesia is very open to entrepreneurship ecosystem and business opportunities, especially the young generation who got exposed to a large amount of information and potential opportunities by having the internet and various sources of information.



Figure 21. Top 10 Countries with the Most Startups

Source: Demand Stage, Startup Statistics

Statistically from figure above shows that Indonesia is among the countries with the most startups in the world, the term itself meaning that a new business in the early stage of operating by one or more entrepreneurs, we also found out that Indonesia is open to the innovation and development of digital business enable Indonesia to be open with startup cultures and ecosystem.

#### **4.5 TECHNOLOGICAL SOLUTIONS**

Theories and findings show that Indonesia has a big potential for using technology, the internet, and social media to create solutions to current problems, including food waste in household areas in Indonesia, statistically, it shows that there is high potential for entrepreneurs and business units to explore the option not only to gain profits but also creating comprehensive solutions to the economical, environmental, and social problem.

A. Strategy Formulation

In this stage when formulating a strategy the vision and the purpose are to reduce food waste in household areas in Indonesia which the business unit/ institution and individuals can do, and to be able to do this, every aspect of people needs to collaborate.

B. Strategy Development

In this stage, we need to know the potential and challenges, which from data I developed some strategies that I think can work in Indonesia with the current circumstances, following :

According to the data, Indonesia is one of the countries that is open to innovation and culture of business, technology, and startups, therefore some of the following strategies apply for business ideas to reduce food waste in households areas in Indonesia.

#### 4.5.1 Smart Kitchen Appliances :

Certainly, to address food waste generated at the household level, the solutions need to be simple, practical, and easily applicable. Various companies worldwide have developed sustainable products aimed at reducing food waste. For instance, startups like Mill in the USA and FoodCycler in Canada offer bins designed to convert food scraps and organic waste into nutrient-rich compost. These compact, eco-friendly devices are intended for household use. The fundamental concept employed by these companies is based on the notion that food waste from households commonly ends up in landfills, a situation similar to what has been observed in Indonesia. Therefore, similar types of products could be promoted in Indonesia as solutions for reducing food waste. Moreover, the resulting compost can be utilized sustainably, such as for feeding animals or enriching soil for plant growth.

To evaluate the potential of such a company with similar product ideas, conducting a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis would be beneficial. This analysis method allows for an assessment of the company's internal strengths and weaknesses, as well as the external opportunities and threats it might encounter in the market.

	STRENGTHS		OPPORTUNITIES
1.	Potential products are good for the circular economy which gives organic waste the potential to be transformed into a valuable resource.	1.	The culture of new business and startups is open to the people which gives big potential markets for new entrepreneurs.
2.	Environmental Awareness: Indonesia is increasingly recognizing the importance of sustainability and environmental conservation, making eco-friendly products appealing to a growing market segment	2.	Changing Consumer Habits: As awareness of environmental issues grows, consumers may be more willing to adopt sustainable practices, creating a demand for food waste reduction solutions
3.	Rising Food Waste Concerns: As urbanization and changing lifestyles continue, concerns about food waste in urban areas have grown, creating a demand for convenient solutions to address this issue.	3.	Partnerships and Collaborations: Collaborating with local environmental organizations, waste management agencies, or retailers can help raise awareness and reach a broader audience.
4.	Government Initiatives: The Indonesian government has shown interest in addressing waste management and environmental issues, potentially creating opportunities for businesses involved in eco-friendly waste reduction.	4.	Product Customization: Tailoring products to fit the specific needs and preferences of Indonesian households can be an opportunity for market differentiation.
5.	Scalability: Offering products that cater to different household sizes and waste generation rates allows for a wide target market.		

## Table 7. SWOT Analysis of Smart Kitchen Appliances

	WEAKNESSES		THREATS
<ol> <li>1.</li> <li>2.</li> <li>3.</li> </ol>	Consumer Education: There might be a need to educate consumers about the benefits of in-home food waste composting and how to use these products effectively. Affordability: The initial cost of in- home food waste composting devices can be a barrier for some consumers in a market where price sensitivity can be a challenge. Infrastructure: The availability of composting infrastructure, like local collection and recycling facilities, may not be widespread, potentially limiting the perceived need for in-home composting.	<ol> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> </ol>	Competition: Competing with established brands and alternative food waste reduction methods, such as traditional composting or disposal, can be a challenge. Regulatory Hurdles: Evolving regulations related to waste management and composting practices could affect product adoption and operations. Cultural Factors: Cultural perceptions and practices related to food waste and composting may vary and influence product adoption. Economic Conditions: Economic conditions and consumer spending can impact the adoption of premium, eco-friendly products.
		5.	Intrastructure Challenges: Inadequate waste management
			infrastructure in some areas of
			Indonesia might limit the impact of in-home composting solutions
l			in nome composing solutions.

Source: Own Development

# **4.5.2 Digital Applications :**

Name: BEUANG

Headquarters: Jakarta, Indonesia

Production area: Digitally in Indonesia

Expected Customers: Indonesian market [ people above 18 years]

Product and service:

# **4.5.2.1 Food Waste Combating Apps**

In Europe, several apps have already been developed by some companies, for example, Too Good To Go, Olio, ResQ, and Munch. All of these companies work with Groceries shops, Restaurants, Hotels, and Bakeries to sell products at very affordable prices of products before they become expired or not consumable, with this

strategy, not only generates profit for the companies, but it is also helping to combat food waste and spread awareness of food security and sustainability. However, while most of the apps mentioned above work with the vendors, only Olio works with households, which connects consumer to consumer (C2C) and this similar system is what the Indonesian market needs.

Prototype :

# Figure 22. BEUANG App for Combating Food Waste, (a) Cover Page, (b) Menu Options, (c) Give and Take



(b)





#### Source: Own Development

The figure above shows the prototype of the app development, (a) the cover page which the slogan are connecting people and beating food waste to remind the users that the aims of the company are to reduce food waste by connecting people, restaurants, bakery, grocery shops, even individuals. Figure (b) shows options that the app included, which for service areas for advertising foods from hotels, restaurants, bakeries, and the person can advertise in that section for a lower price of a minimum of 60% discount and any foods that are wanting to exchange will show conversation in figure (c), which negotiation can happen.

(c)

# Table 8. SWOT Food Waste Combating Apps

STR	ENGTHS:		OPPORTUNITIES:
<ol> <li>Environmental C is a growing awar environmental iss which can create household food w solutions.</li> <li>Smartphone Ado usage is on the ris providing a suital distribution of yo</li> <li>Behavioral Chang right incentives a content, househol change their food habits.</li> <li>Local Partnership local NGOs, com or businesses to p within specific ne communities.</li> </ol>	onsciousness: There reness of sues in Indonesia, a demand for vaste reduction ption: Smartphone se in Indonesia, ble platform for the ur app. ge Potential: With the nd educational lds may be willing to l waste disposal bs: Collaborate with munity organizations, promote your app eighborhoods or	1. 2. 3.	User Education: Develop user-friendly and informative content to educate households about the benefits of reducing food waste and how to use your app effectively. Local Partnerships: Collaborate with local grocery stores, markets, and food vendors to promote your app and create a network of waste reduction advocates. Incentives: Consider introducing incentives like discounts or rewards for active users to encourage food waste reduction efforts.
WEA	KNESSES:		THREATS:
<ol> <li>User Engagemen sustained user en app can be a chal require changing behaviors.</li> <li>Competition: The competitive, with apps. Standing ou value will be esset</li> <li>Localization: Ada languages and cu require careful co pose challenges.</li> </ol>	t: Ensuring active and gagement with the lenge, as it may long-established e app market can be a range of similar at and offering unique ential. apting the app to local ltural nuances may onsideration and could	<ol> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> </ol>	Regulatory Changes: Keep an eye on potential changes in local waste management regulations or policies that may impact your app's operations. User Resistance: Households may resist changing their food disposal habits or using new technology for this purpose. Technical Challenges: Developing and maintaining a user-friendly, bug-free app can be complex and may require ongoing technical support and updates. Economic Factors: Economic conditions, including household budgets and spending, can influence the adoption of premium app features or incentives. Cultural Variations: Recognize and address cultural variations in practices related to food waste within Indonesia.

Source: Own Development

## 4.5.2.3 Blue Ocean :

1. Create:

a. Develop an easy-to-use app for households, minimizing entry barriers.

b. Craft a unique value proposition focusing on reducing food waste and offering economic benefits.

c. Incentivize behavioral change with rewards and discounts.

2. Raise:

a. Educate users about food waste via the app.

b. Keep users engaged with gamification and challenges.

c. Collaborate with local businesses to promote the app as a solution for reducing food waste.

- 3. Eliminate:
  - a. Simplify the app by focusing on its primary goal—reduce food waste.
  - b. Ensure the app is cost-effective or free for wider household adoption.

c. Address data security concerns with robust protection measures and transparent policies.

4. Reduce:

a. Minimize marketing costs by emphasizing grassroots strategies and partnerships.

b. Simplify the user onboarding process for a smoother app setup.

c. Use persuasive communication and incentives to reduce resistance to changing food waste behaviors.

5. Overcome:

a. Stand out in the market by offering a unique and compelling value proposition.

b. Adapt the app's messaging and features to align with local cultural norms.

c. Address technological challenges by providing ongoing support and improvements for an enhanced user experience.

#### 6. Additional Perspectives:

a. Incorporate a feedback loop in the app for user input and suggestions.

b. Continuously assess user behavior and the app's impact on reducing food waste to adapt and innovate as needed.

# Table 9. Strategy Canvas Table

Competing Factors	Offering level of BeUang	Industry Value
User-Friendliness	9	6
Cost	7	6
Rewards and Incentives	9	5
Educational Content	9	5
Engagement Features	6	6
Local Partnerships	8	5
Technical Reliability	7	7
Cultural Adaptation	9	5
Privacy and Data Security	9	9
Economic Benefits	9	6

Source: Own Development



Figure 23. Chart of Strategy Canvas

Source: Own Development

The figure above shows the elevation version of the table which contains the strategy canvas of the business idea for the blue ocean strategy, there are some considering factors listed above and according to analysis, most of the factors are above the industry value. The blue line indicates the factors value of BeUang and the orange one indicates the industry value.

## 4.5.2.4 Solid Waste Bank

Solid Waste Bank, as we found out, has a good potential for development in Indonesia, it is already applied in some areas in Indonesia, one of it is Medan City, to be able to develop this more, using the advanced method of involving technology is one of the solutions, not only because it will make it easier, faster, it will also involve many more people, especially young generations as we know that in Indonesia the users of the internet keep increasing which potentially reaches more people.

Prototype :

# Figure 24. BEUANG Solid Waste Bank App, (a) Main Page, (b) Selection Menu, (c) Service Conversation Chat



(a)



(c)



Source: Own Development

The figure above shows part (a) is how the app looks like as a cover page, including menus that people can see in (b) section, which contains the homepage of the app, and blog, which the company can put some information about the company itself, the app and another consideration, partnership hich includes which partners they work with, career, and service button which when it clicked, there are two options, "Find Out

(b)

Qualification" which customers can see if the waste that they have will be qualified to be processed or not, and if it is, customer can choose the pickup service which shows in figure (c), after it accepted, customers will get an incentive in the icon that looks like basket shown in figure (b) on the top right side.

# Table 10. SWOT Analysis of Solid Waste Bank

	Strengths:		Opportunities:
1.	Environmental Awareness: Indonesia's increasing awareness of environmental sustainability creates a favorable environment for waste management and recycling initiativas	1.	Government Support: Seek support and incentives through government programs promoting waste management and recycling.
2.	Community Engagement: Indonesian communities often have strong social bonds, making it easier to engage them	۷.	content within the app to raise awareness about the benefits of recycling and responsible waste management
3.	in community-based waste collection and recycling efforts. Government Support: Aligning your	3.	Data Utilization: Collecting and utilizing data on recycling habits can support research, advocacy, and informed policy-
	app with government policies promoting waste management and recycling can provide regulatory	4.	making. Scaling: Consider expanding your app's reach to cover more geographical areas in
4.	support and incentives. Partnership Opportunities:		other regions for broader impact.
	Collaborating with local recycling centers, businesses, and NGOs can strengthen your app's impact.		I
	Weaknesses:		Threats:
1.	User Adoption: Encouraging users to adopt new recycling habits can be challenging, as it involves changing established behaviors and practices.	1.	Competition: There may be other recycling initiatives and programs in Indonesia, some of which might already have established user bases.
2.	Logistical Complexities: Managing the logistics of waste collection, transportation, and processing can be complex and costly.	2.	Regulatory Changes: Changing waste management regulations and policies could impact your app's operations and incentives.
3.	Infrastructure Gaps: The effectiveness of your app depends on the availability of recycling facilities and an efficient waste management infrastructure, which may vary by region.	3.	Economic Factors: Economic conditions in Indonesia can influence user participation, especially if the rewards offered are not perceived as valuable.

Source: Own Development

# C. Strategy Implementation

Implementing the strategies above required knowing the availabilities of the inside relations and resources allocation, putting action plan, and also knowing the company's execution will be needed, the combination between resources allocation and policy in Indonesia needs to be learned in depth.

# D. Strategy Evaluation

This phase of strategic planning of the strategies provided above can be measured by assessment of companies that implemented the strategies, it can also include feedback when it comes to customers and outside relations, monitoring and evaluating are very important processes.

#### **CHAPTER 5**

# CONCLUSIONS AND RECOMMENDATIONS

#### **5.1 CONCLUSIONS**

This study focuses on the strategic approaches to reducing food waste in household areas the statistical and case study data found that the highest amount of waste came from household areas. In Indonesia itself, it affects the economy, environment, food security, and even social and health aspects. This study shows in-depth information about the levels and factors contributing to food waste, existing strategies how it applied, and the end results. The research found that the involvement of technology is one of the important factors to be considered, therefore that involvement must be used for the creation of awareness of people. The issue of food waste implementing strategic planning helps to narrow down the objectives, and solutions, and also to identify areas of improvement to reduce the level of food waste in Indonesia. Another important consideration is involvement of each individual, also the role of government plays a vital part because not only affects individuals, but also affects Institutions, businesses, and non-profit organizations that want to apply certain strategies to Indonesian people.

In the pursuit of understanding and mitigating food waste in Indonesian households, this research has unearthed critical insights into the factors contributing to food waste, the economic and environmental implications, and the effectiveness of strategic approaches. Notably, the case studies have shed light on the diverse nature of food waste behaviors in Indonesian households. The research has successfully met its objectives. We have assessed the current levels of food waste, identified contributing factors, analyzed economic implications, and suggested a comprehensive strategy framework. The case studies and empirical findings have enriched our understanding of the complex issue of food waste in Indonesian households.

This research offers valuable insights into the field of food waste reduction, particularly within the Indonesian household context. It underscores the significance of considering cultural practices, behavioral dynamics, and economic implications when crafting food waste reduction strategies. These findings can serve as a foundation for further studies and policy development. The strategic approaches, derived from case study findings and systematic planning, have been successfully integrated to provide a comprehensive framework for food waste reduction. The integration ensures that a well-rounded solution addresses the multifaceted challenges within Indonesian households.

Challenges encountered, such as the spreading of information and developments of technology, have been recognized. These challenges underline the importance of culturally sensitive approaches and the need for accessible, technology-agnostic interventions. Future research should explore the long-term sustainability of food waste reduction practices, assess the scalability of community-based education, and delve into the economic viability of technological solutions. Further studies can also evaluate the environmental impact of successful food waste reduction. This research contributes to the broader movement toward sustainability. By addressing food waste at the household level, we not only reduce economic burden and environmental damage but also foster responsible consumption habits, aligning with global sustainability goals.

The successful implementation of our strategic approaches promises a range of benefits. Households can save on food values, the country can reduce its environmental footprint, and Indonesian society can embrace a more sustainable future. In conclusion, this research underscores the pressing need to address food waste in Indonesian households. By identifying the contributing factors, developing comprehensive strategies, and fostering awareness, we can collectively work toward a more sustainable and responsible future, both economically and environmentally, in Indonesia.

#### **5.2 RECOMMENDATIONS**

However, several studies show that one of the best ways to combat food waste is through education and campaigns which already exist in Indonesia, but from my point of view, since Indonesia has uneven infrastructure, the spreading of information and campaigns would not affect much, but when it comes to technology, innovation and internet, Indonesia is one of the countries in Asia that has increasing amount of users and developments of it, which I strongly believe is one of the best solutions to reach big numbers of people and encouraging to be part of the strategies.

Several recommendations according to the findings are :

- Our research suggests a series of practical recommendations. By following the strategic planning, strategic approaches to be implemented will be more effective and efficient.
- Policymakers are encouraged to consider incentives for the adoption of food waste reduction practices. Community leaders should promote culturally sensitive educational campaigns, and households should embrace responsible food consumption habits.
- Not only do governments have involvement, also businesses and institutions also have roles in this matter, especially when it comes to Company Corporate Social Responsibility (CCSR), the contributions to the society can help in the area of food waste.
- 4. Support for Community-Based Initiatives in which Governments, Businesses, and Institutions can provide funding and logistical support to community-based food waste reduction initiatives, facilitating the development and delivery of educational campaigns.
- 5. Technological Development which promotes access to technological solutions across various income levels and regions, ensuring that all households can benefit from innovations in food waste reduction, technological solutions, such as reminders for responsible food storage or consumption, to maintain user engagement can be included as well as feedback mechanisms to gather user feedback and improve strategies over time.
- 6. Sustainability of Programs: Ensure the sustainability of community-based initiatives by developing long-term engagement plans and ongoing funding strategies.

#### SUMMARY

Food waste is one of the issues that has been talked about for many years globally and also in Indonesia, not only it affect from environmental aspect, but also economical, and society. Food waste in Indonesia is dominated by several factors, including cultural factors, household income, and lifestyles, and the most important things are the awareness of the people about the issue and the existing strategies that have been implemented to reduce food waste in household areas in Indonesia.

This study provides data in depth about Indonesian household level of waste, technological solutions, strategic planning, and potential benefits of the strategies provided, using the methodology of a case study to learn and identify objectives, as secondary data gathering from some sources, including government reports, academic papers, non-profit organizations, and also public data help to build the logical systematic of this research. From the findings, we found out that in Indonesia, the highest waste comes from the households area, which mostly contains carbohydrates the most. The data discovered that FLW generation in Indonesia in 2000 - 2019 has reached 115-184 kg/capita/year.

The behavioral aspect also discovered that most food waste was thrown away or given to feed animals is the most common practice that Indonesian people do according to the statistical data. It is also said that one of the factors of food waste in household areas including poor ways of restoring food, includes packaging from plastics that have low-quality food storage. In terms of economic data, Indonesia has economic loss due to the amount of food waste because it loses its value. in terms of environment, on average, for every ton of FLW over 20 years, about 2,324.24 kilograms of carbon dioxide equivalent (kg CO2-eq.) are produced.

The case study shows that Indonesia has the potentials to reduce, recycle, and reuse process, which mostly came from community-based solutions also the existing solution from governments is not efficient in the long-term, therefore the best way to provide strategic planning and approaches are to include individuals, business organizations or entrepreneurs to develop business strategies that include all aspects to participates. It is a win-win solution in which, every person gets benefits in terms of profits, sustainability, also profits for the company that is included in this matter. The involvement of technology has to be included so that the information can be spread equally, some strategic approaches include smart kitchen appliances which can be used directly in every house in Indonesia, combating food waste apps which also applicable to anyone, and last but not least, the solid waste bank which already exist in Indonesia, but to elevate it more with involvement of technology which will improve the effectiveness of the progress.

#### BIBLIOGRAPHY

- Abioso, W. S., Imam, A. I., Maulana, Y. I., & Prasetyo, M. J. (2021). Virtual Reality Utilization as a Character– building of Children in Waste Problems. *IOP Conference Series: Materials Science and Engineering*, *1158*(1), 012010.
- Ariyani, L., & Ririh, K. R. (2020). Understanding Behavior of Household Food Waste Management: Food Waste Hierarchy Context. *Jurnal Ilmiah Teknik Industri*, 19(2), 142–154.
- Asia: distribution of internet users by country 2022. (n.d.). Statista. Retrieved October 19, 2023, from
- Aschemann-Witzel, J., De Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-Related Food Waste: Causes and Potential for Action. *Sustainability*, 7(6), 6457–6477.
- Avenue, 677 Huntington, Boston, & Ma 02115. (2017, April 26). Food Waste. The Nutrition Source.
- Bacon-Shone, J. H. (2013). *Introduction to Quantitative Research Methods*. Graduate School, The University of Hong Kong.
- Bhatia, A., & Sharma, S. (2023). Identifying determinants of household food waste behavior in urban India. Cleaner Waste Systems, 6, 100105.
- Bryson, J. M., Edwards, L. H., & Van Slyke, D. M. (2018). Getting strategic about strategic planning research. *Public Management Review*, 20(3), 317–339.
- Candy, V., & Gordon, J. (2011). The Historical Development Of Strategic Planning Theories. International Journal of Management & Information Systems (IJMIS), 15(4), 71–90.

- Corrado, S., Caldeira, C., Eriksson, M., Hanssen, O. J., Hauser, H.-E., van Holsteijn, F., Liu, G., Östergren, K., Parry, A., Secondi, L., Stenmarck, Å., & Sala, S. (2019). Food waste accounting methodologies: Challenges, opportunities, and further advancements. *Global Food Security*, 20, 93–100.
- 11. Diana, R., Martianto, D., Baliwati, Y. F., Sukandar, D., & Hendriadi, A. (2023).
   Determinants of Household Food Waste in Southeast Asia: A Systematic Review.
   Journal of Hunger & Environmental Nutrition, 1–12.
- Ejigu, M. E., & Desalegn, T. A. (2023). How does strategic planning influence the performance of financial institutions? An empirical study of Ethiopia. *IIMB Management Review*, 35(1), 26–39.
- Environment, U. N. (2021, March 4). UNEP Food Waste Index Report 2021. UNEP -UN Environment Programme.
- Farahdiba, A. U., Warmadewanthi, I. D. A. A., Fransiscus, Y., Rosyidah, E., Hermana, J., & Yuniarto, A. (2023). The present and proposed sustainable food waste treatment technology in Indonesia: A review. *Environmental Technology & Innovation*, 32, 103256.
- 15. Food Waste. (n.d.). Retrieved September 18, 2023.
- Food Waste and its Links to Greenhouse Gases and Climate Change. (n.d.). Retrieved September 18, 2023.
- Frequently Asked Questions: Reducing Food Waste in the EU. (n.d.). Retrieved August 22, 2023.
- Habib, M. D., Kaur, P., Sharma, V., & Talwar, S. (2023). Analyzing the food waste reduction intentions of UK households. A Value-Attitude-Behavior (VAB) theory perspective. *Journal of Retailing and Consumer Services*, 75, 103486.

- 19. Hafizah, D., Hakim, D. B., Harianto, H., & Nurmalina, R. (2020). Analysing food consumption in Indonesia. *Int J Progress Sci Tech*, *20*(2), 340-7.
- 20. Hafizah, D., Hakim, D. B., Harianto, H., & Nurmalina, R. (2020). The Role of Rice's Price in the Household Consumption in Indonesia. *AGRIEKONOMIKA*, *9*(1), 38–47.
- 21. In Indonesia, over a third of young people want to be entrepreneurs. (2019, August 16).World Economic Forum.
- 22. International Day of Awareness of Food Loss and Waste. (n.d.). Retrieved September 18, 2023.
- 23. Johnston, M. P. (2014). Secondary Data Analysis: A Method of which the Time Has Come. *Qualitative and Quantitative Methods in Libraries*, *3*(3), 619–626.
- 24. Khair, H., Rachman, I., & Matsumoto, T. (2019). Analyzing household waste generation and its composition to expand the solid waste bank program in Indonesia: a case study of Medan City. *Journal of Material Cycles and Waste Management*, 21(4), 1027–1037.
- 25. Kim, J., Rundle-Thiele, S., Knox, K., Burke, K., & Bogomolova, S. (2020). Consumer perspectives on household food waste reduction campaigns. *Journal of Cleaner Production*, 243, 118608.
- Martin-Rios, C., Hofmann, A., & Mackenzie, N. (2021). Sustainability-Oriented Innovations in Food Waste Management Technology. *Sustainability*, *13*(1), 210.
- 27. Ministry of National Development Planning of the Republic of Indonesia. (2021).Executive Summary for Policy Makers: Food Loss & Waste in Indonesia. 20.
- 28. Rasyid, M., Kristina, A., Sutikno, Sunaryati, & Yuliani, T. (2020). Poverty Conditions and Patterns of Consumption: An Engel Function Analysis in East Java and Bali, Indonesia. 1062–1076.

- 29. Rusdiana, A., Subandi, M., & Mulyawan, S. (2020). The Relationship Between Socioeconomic Status and Consumption Pattern of Fishermen Household in Indonesia. *Asian Journal of Agriculture and Rural Development*, 10(1), 141–148.
- Russell, S. V., Young, C. W., Unsworth, K. L., & Robinson, C. (2017). Bringing habits and emotions into food waste behavior. *Resources, Conservation and Recycling*, 125, 107–114.
- 31. Schanes, K., Dobernig, K., & Gözet, B. (2018). Food waste matters A systematic review of household food waste practices and their policy implications. *Journal of Cleaner Production*, 182, 978–991.
- 32. Seers, K. (2012). Qualitative data analysis. Evidence-Based Nursing, 15(1), 2–2.
- 33. Shewale, R. (2023, September 28). 100+ Startup Statistics In 2023: Current State, Funding And More. *DemandSage*.
- 34. Soma, T. (2020). Space to waste: the influence of income and retail choice on household food consumption and food waste in Indonesia. *International Planning Studies*, 25(4), 372–392.
- 35. Steiner, G. A. (2010). Strategic Planning. Simon and Schuster.
- 36. Sutori. (n.d.). Retrieved June 18, 2023.
- 37. Tonini, D., Albizzati, P. F., & Astrup, T. F. (2018). Environmental impacts of food waste: Learnings and challenges from a case study on the UK. *Waste Management*, 76, 744–766.
- 38. Vel, J. A. C., McCarthy, J. F., & Zen, Z. (2016). The Conflicted Nature of Food Security Policy: Balancing Rice, Sugar, and Palm Oil in Indonesia. *Anthropological Forum*, 26(3), 233–247.

 Waluyo, & Kharisma, D. B. (2023). Circular economy and food waste problems in Indonesia: Lessons from the policies of leading Countries. *Cogent Social Sciences*, 9(1), 2202938.

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