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Prevention of Tabzir in Muslim Households Food Consumption

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Abstract
Islam forbids tabzir (wasteful behavior) concerning food and all activities. However, Indonesia, which has a Muslim-majority population, is among the countries with the highest levels of food loss and waste globally. Food waste has a detrimental impact on the environment, economy, human health, and food security, hindering the achievement of the SDGs. This study aims to examine Muslim households' consumption patterns and identify food waste prevention strategies. A qualitative SWOT-ANP technique was applied using nine respondents, including experts, academics, and practitioners. The findings suggest that households, from an internal perspective, should prioritize sharing surplus food with those in need, as well as adopting thoughtful shopping and cooking habits, avoiding the tendency to over-purchase or over-prepare food. Three external strategies were identified: (1) campaigns by governments, agencies, and communities to raise awareness of food waste's negative effects; (2) education on proper food processing, storage, and management; (3) policies regulating food waste prevention and management. Ultimately, preventing food waste behavior requires the collaboration of all parties, including the government, religious authorities, communities, and households.

Keywords: Consumption; Food Waste Behavior; Muslim Household; Prevention; Sustainability

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Introduction

Indonesia is one of the Muslim-majority countries with the second-highest level of food loss and waste in the world, with an average of approximately 300 kg per person per year, trailing only Saudi Arabia (427 kg), the United States (227 kg), and the United Arab Emirates (196 kg) (BCFN Foundation, 2019). Without policy intervention, food loss and waste in Indonesia are expected to reach 112 million tons per year, or 344 kg per capita per year, between 2020 and 2045. According to the strategic scenario, food loss and waste can be reduced to 49 million tons per year, or around 116 kg per capita per year, by 2045, representing a 55.88% decline (Bappenas, 2021). Nonetheless, Bappenas emphasizes that the strategy for preventing food loss and waste must begin with behavioral change, followed by improvements in food system support, strengthened regulations, optimized funding, food waste utilization, and the development of studies and data collection on food loss and waste.

Food waste threatens a country's independence, sovereignty, and security (Irani et al., 2018). Furthermore, it contradicts the goals of sustainable development, specifically the SDGs. According to the US Environmental Protection Agency, food waste is currently the largest contributor to landfill waste (Andrews & Naidenko, 2020). A holistic approach to food waste prevention is essential to reduce emissions because methane and carbon dioxide are produced by food degradation in landfills (Swannell et al., 2019). Additionally, food waste depletes the quality of natural resources used in food production and distribution. In developing countries, food waste primarily occurs in the early stages of the supply chain, caused by financial, managerial, and technical constraints in harvesting and storage. In contrast, in developed countries, food is typically wasted during the final stage of consumer behavior (FAO, 2011).

Food waste is currently a global issue (Schanes et al., 2018). It adversely affects the environment, economy, and food security, prompting nations worldwide to implement measures to reduce and eliminate it (Thyberg & Tonjes, 2016). Food waste violates at least eight of the 17 SDGs: (1) No Poverty; (2) Zero Hunger; (3) Good Health and Well-being; (4) Clean Water and Sanitation; (8) Decent Work and Economic Growth; (10) Reduced Inequality; (11) Sustainable Cities and Communities; and (12) Responsible Consumption and Production. Food waste causes environmental damage, endangers health, wastes resources and economic opportunities, and leads to unsanitary living conditions, violating SDGs 3, 4, 8, 10, 11, and 12. It also contributes to increased inequality, as the wealthy can afford to waste

food, while the poor struggle to obtain it, contradicting the goals of SDGs 1 (No Poverty) and 2 (Zero Hunger).

Households are the largest source of food waste. In developed countries, households contributed the most to food waste (USD 144 billion), followed by supermarkets (USD 18.24 billion), full-service restaurants (USD 15.98 billion), farmers (USD 15 billion), food institutions and services (USD 11.4 billion), limited-service restaurants (USD 9.12 billion), factories (USD 2 billion), and the government (USD 1.14 billion) (Save on Energy, 2019). Household food waste significantly contributes to global environmental issues such as climate change and the depletion of limited natural resources (water, land, etc.). Therefore, strategies to reduce household food waste are critical (Schmidt, 2016). According to UK studies, the amount of food and drink waste at the household level accounts for approximately 22% (330 kg per household per year) of all food and drink purchased, of which 65% (215 kg per household per year) could have been avoided, indicating it was still edible (WRAP Final Report, 2009).

According to (Bappenas, 2021), five strategic directions guide the management of food loss and food waste in Indonesia: (1) initiating behavioral change, (2) improving the food system, (3) strengthening regulations and optimizing funding, (4) utilizing food loss and waste (FLW), and (5) developing studies and data collection on FLW. Without a management strategy, the generation of FLW in Indonesia is projected to reach 112 million tonnes per year, or 344 kg per capita per year, by 2045. This study focuses on changes in household consumption behavior and policy implementation. The aim is to analyze strategies for preventing food waste behavior in Muslim households in Indonesia. Currently, most Indonesian households regard food waste as normal, even as the quantity of wasted food increases daily. Given the lack of studies on food waste prevention in Muslim households in Indonesia, the findings of this research are significant.

Literature Review

Throwing away food when it is ready for consumption is referred to as food waste. Food waste also represents a waste of resources such as labor, water, energy, land, and other natural resources used in the food manufacturing process (Bellemare et al., 2017). Food loss refers to the wastage that occurs in the supply chain, from producers to markets, due to issues before, during, and after harvests, including post-harvest storage, packaging, and transportation. A key cause of food

loss can be the lack of infrastructure, markets, price mechanisms, or policies that result in oversupply (HLPE, 2014).

Food waste is a component of consumption activities, where consumption is defined as household expenditure to acquire goods and services, including durable and non-durable goods, such as vehicles, food, and beverages, as well as intangible services, such as healthcare and education (Mankiw, 2021). Income, prices, and preferences significantly impact consumption (Greenlaw et al., 2022). As income levels rise, so does consumption; conversely, lower income limits the number of goods and services that can be purchased. In addition to income, the price level also influences consumption: higher prices reduce the amount of goods and services that can be bought, while lower prices increase purchasing power. Consumer preferences vary based on upbringing, social standing, and other factors, influencing their choices (Mankiw, 2010).

According to Choudhury, Islamic economics seeks to correct consumption behavior in capitalist economies: (1) a Muslim must prioritize fulfilling basic needs for a decent life, and the consumption of luxury goods leading to *israf* is forbidden; (2) it is prohibited to be excessive in both production and consumption, particularly when it leads to the waste of resources (Choudhury, 1986). Consumption behavior encompasses the mental, emotional, and physical activities involved in selecting, purchasing, using, and disposing of products and services to meet one's needs and desires (Priest et al., n.d.). According to Khan, the Qur'an identifies four dimensions of consumer behavior: moderation, excess (*israf*), waste (*tabdzir*), and greed (*bakhil*). These dimensions are further categorized into three contexts: (a) personal consumption choices; (b) social context, which includes family, friends, and community; and (c) the public sector context. The interpretation of moderation, extravagance, and *tabdzir* varies depending on context. Factors such as income, wealth, occupation, education, culture, religion, and social ties also play a role in shaping consumer behavior (Khan, 2020).

Islam was the first to advocate against food waste and promote moderation in all aspects of life. Islam is closely tied to theological accuracy and morality (Wijaya et al., 2021). The Qur'an strictly prohibits wasting food (*tabzir*) and instructs Muslims to share food with relatives, the poor, and travelers in need, while labeling *tabzir* as a devilish act (Qur'an, Al-Isra, 17:26–27). The Qur'an also promotes the consumption of a variety of healthy foods (Qur'an, Al-Insan, 76:8). Several studies suggest that sharing and generosity can increase happiness (Aydoğdu et al., 2023;

Hovasapian & Levine, 2018). Helping others leads to happiness, and happier individuals tend to be healthier (Kushlev et al., 2020).

In a Hadith narrated by Ahmad, the Messenger of Allah forbade Muslims from wasting food, even advising that food be eaten completely with nothing left on the plate. Rasulullah SAW said to Abbas' mother,

> "When one of you eats, let him not wipe his hand until he licks it." (According to Bukhari and Moslem.) "I heard from Jabir ibn Abdullah, saying; I heard that from the Prophet," Abu Az-Zubair said. And do not wash his hands until he licks or is licked, and do not take paper (to clean it) before licking his hands or licking them, for there is a blessing at the end of the food." (Ahmad).

As access to goods and services improves, and as financial literacy and lifestyles evolve, the community has become more consumptive (Pulungan & Febriaty, 2018). Consumptive behavior is also fueled by the availability of social media and online shopping platforms, which make purchasing goods and services easier (Miranda & Lubis, 2017). Furthermore, increased income tends to encourage more spending (Ratna & Nasrah, 2015). However, Islam prohibits excessive or wasteful behavior in all activities (Q.S. Al-A'raf: 31). This prohibition is reflected in the Prophet's teachings, which discourage wasting food. In another Hadith narrated by Anas bin Malik, the Messenger of Allah said,

> "If a bite of food falls among you, let him clean his dirt and (then) let him eat it and not leave it to the devil." "And he ordered us to finish the food on the plate," Anas said. "Indeed, you do not know which food contains a blessing," he added. (Moslem No. 2034).

These studies conclude that households are the largest contributors to food waste, with social and psychological factors also playing a significant role in food waste behavior. Policies implemented in several developed countries have not been effective in curbing this behavior. The lack of government policies in Indonesia, both at the regional and national levels, to address food waste underscores the importance of this research in formulating effective strategies. Food waste prevention is a global issue, and with the 2030 Sustainable Development Goals (SDGs), worldwide participation is crucial to achieving these goals. Unfortunately, no reviews have evaluated the effectiveness of interventions targeting food waste prevention at the consumption stage of the food system. Thus, this research aims to analyze strategies for preventing food waste behavior in Muslim households in Indonesia.

Methods

The SWOT-ANP (Strengths, Weaknesses, Opportunities, and Threats - Analytic Network Process) analysis was employed to develop household food waste prevention strategies. This approach is based on the logic of maximizing internal factors, such as strengths and opportunities, while minimizing external factors, such as weaknesses and threats. The SWOT-ANP method integrates SWOT analysis with the ANP framework, allowing for the consideration of interdependencies among factors, resulting in more robust strategic decisions. The SO strategy takes advantage of external opportunities by leveraging internal strengths, while the WO strategy overcomes internal weaknesses by capitalizing on external opportunities. The ST strategy focuses on mitigating external threats by harnessing strengths, whereas the WT strategy aims to reduce internal weaknesses while avoiding external threats (Wheelen & Hunger, 2018).

This study specifically examines the strengths, weaknesses, opportunities, and threats related to Muslim households in preventing food waste. A SWOT analysis was conducted using a literature review and in-depth interviews with experts and stakeholders, encompassing perspectives from practitioners, academics, households, and government officials. Nine respondents were selected for the ANP evaluation to ensure a comprehensive analysis. The ANP method, which is effective in formulating policy strategies for both companies and governments, was employed to weigh the relative importance of each SWOT factor, as recommended by prior studies (Dağdeviren & Eraslan, 2008; Hemmati et al., 2018).

The ANP method is particularly effective in capturing the interdependencies among different SWOT factors, thereby facilitating a more nuanced strategy formulation process. Research indicates that household dynamics, cultural expectations, and socio-demographic factors significantly influence food waste behaviors. Moreover, the application of ANP in conjunction with SWOT analysis has been validated in various contexts, demonstrating its effectiveness in strategic decision-making across sectors such as energy management, tourism, and agriculture (Baş, 2013; Kharisma & Hadiyanto, 2019). For instance, studies have shown that the ANP can effectively prioritize strategies by capturing the feedback loops and interdependencies among SWOT factors, thus providing a clearer picture of the strategic options available (Bhutto et al., 2022; Lee, 2015). This methodological synergy not only enhances the robustness of the analysis but also ensures that the strategies developed are grounded in empirical evidence and stakeholder perspectives.

Synthesis and Analysis

a. Geometric Means

To determine the results of the individual assessments of the respondents and the results of their opinions in one group an assessment was carried out by calculating the geometric mean (Saaty, 2008). Questions in the form of comparisons (pairwise comparison) from respondents will be combined to form a consensus. The geometric mean is a type of average calculation that shows a certain tendency or value and has the following formula (Ascarya, 2012):

$$(\prod_{i}^{n} = 1a_1)^{1/n} = \sqrt[n]{a_1 a_2 \_ a_n} \quad (1.1)$$

b. Rater Agreement

Rater agreement is a measure that shows the level of suitability (approval) of respondents (R1-Rn) for a problem in one cluster. The tool used to measure rater agreement is Kendall's Coefficient of Concordance (W; 0 < W≤ 1). W=1 indicates a perfect fit (Ascarya & Yumanita, 2005). To calculate Kendall's (W), the first is to rank each answer and then add them up.

$$R_1 = \sum_{j}^{m} = 1r_{i,j} \quad (1.2)$$

The average value of the total ranking is

$$R = \frac{1}{2}m(n+1) \quad (1.3)$$

The sum of the squared deviations (S) is calculated by the following formula:

$$S = \sum_{i}^{n} = 1(R_i - \bar{R})^2 \quad (1.4)$$

Thus, Kendall's W is obtained as follows:

$$W = \frac{12S}{m^2(n^3 - n)} \quad (1.5)$$

If the value of the W test is 1 (W = 1), it can be concluded that the assessment or opinion of the respondents has perfect agreement, whereas when the W value is 0 or closer to 0, it indicates disagreement between respondents' answers or varied answers (Ascarya, 2012).

The number of samples/respondents was not used as a criterion for validity in the ANP analysis (Ascarya & Yumanita, 2005), but this research deployed nine respondents from experts and practicians (FAO Indonesia, Food Bank, Academician, Government, and Household representative). The ANP method is used as an

analytical tool, and it is processed using the "Super Decisions" software. ANP is a mathematical theory that can analyze the effect using an approach of assumptions to solve the form of the problem. This method is used in the form of a solution that considers the adjustment of the problem's complexity by analyzing the synthesis and is accompanied by a priority scale that produces the greatest priority effect. The dependent factor model and systematic feedback can also be explained by ANP. In ANP applications, decisions are made by considering and validating empirical experience (Saaty, 2016).

SWOT Variables

The model construction is based on a review of the literature, both theoretically and empirically. Then, from the literature review, questions were prepared and asked to experts and practitioners of food waste (households) as well as experts in their fields through in-depth interviews as shown at Table 1.

Table 1. The SWOT matrix of food waste prevention strategies

INTERNAL / EXTERNAL	STRENGTHS (S)	WEAKNESSES (W)
	▪ Moslems believe that there is a sin in throwing away food and being rewarded for sharing. ▪ Household handles their grocery and food needs. ▪ Household prepare their meals ▪ Most households own a refrigerator	▪ Households tempted by the promo ▪ Lack of understanding of the consequences of food waste in household ▪ lack of expertise in managing food waste in household ▪ consumptive behavior in the household
OPPORTUNITIES (O)	**STRATEGY (SO)**	**STRATEGY (WO)**
▪ Many people need food ▪ Utilization of food waste for compost and feed.	▪ Sharing meals and foods (S1, O2) ▪ Education in food preparation and waste management (S2, S3, O2, O3)	▪ Smart purchasing and cooking (W1, W2, W3, O1) ▪ Food waste awareness campaign and socialization (W3, W4, O3)
THREATS (T)	**STRATEGY (ST)**	**STRATEGY (WT)**
▪ Many promotions are available ▪ Easy access to buy food ▪ No sanctions for food waster	▪ Making rules and regulations (S1, S2, S3, T1, T2, T3 T4) ▪	▪ Smart purchasing and cooking (W1, W2, W3, W4, T1, T2, T3, T4)

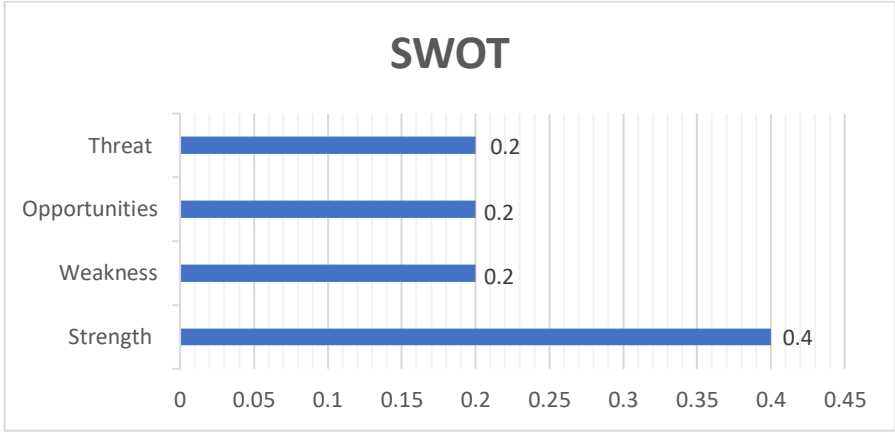
Result and Discussions

After examining the strengths, weaknesses, opportunities, and threats (SWOT) aspects, a matrix was developed to outline the corresponding strategies. The strengths and opportunities (SO) strategy focused on producing food and other resources for sharing with those in need, as well as donating, followed by education on food waste processing, storage, and management. The weaknesses and opportunities (WO) strategy aimed to reduce excessive household spending and cooking, while also raising awareness about the negative impacts of food waste. Additionally, the strengths and threats (ST) strategy concentrated on regulating food waste prevention through measures such as reducing subsidies, imposing tariffs, and introducing rewards or penalties for individuals or groups involved in food waste. Finally, the weaknesses and threats (WT) strategy emphasized wise shopping and cooking practices to minimize food waste at the household level.

SWOT Aspect Priority with ANP Approach

One of the ANP's goals is to determine the priority aspects of the four SWOT aspects (strengths, weaknesses, opportunities, and threats), which are the main priorities. Data processing employs "Super Decision" software to determine the priorities of all indicators as well as the respondents' strategic priorities. The results of data processing on ANP based on the assessment of research respondents described in the Figure 1.

Figure 1. Priority of SWOT variable from ANP

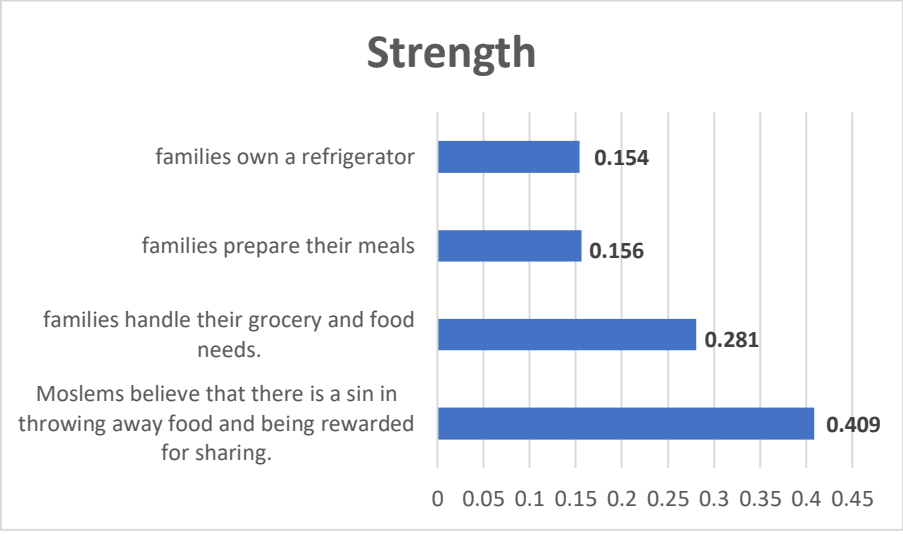


The results of data processing show that the strongest aspects of SWOT become a priority in preventing food waste behavior in Moslem households in Indonesia, with a value of 0.4 being the highest compared to all other SWOT aspects, such as weaknesses, opportunities, and threats, each of which has the same number of 0.2. From this, we can conclude that to prevent food waste behavior in the household, it must be optimized from the aspect of strength. By optimizing the strength aspect, households can reduce their food waste. The aspects of strength that can be optimized in preventing food waste are the existence of religious beliefs about the prohibition of throwing away food and sharing orders, managing their own food needs from shopping to cooking, and the majority of Muslim households cooking their own needs, then have a refrigerator to store foods and drinks.

a. The Priority of Strength Aspect

The presence of religious beliefs regarding the command to share and prohibition of throwing away food is a top priority, with a rater agreement value of 0.409, followed by the aspect of managing one's own needs, which becomes the second priority with several 0.281, the next strength aspect is cooking yourself, with a rater agreement value of 0.156, and having a cupboard is in the last order. with a value of 0.154, ice or refrigerator to store food, so it does not spoil quickly.

Figure 2. Priority of strength aspect used ANP Super Decision



Religious beliefs regarding the prohibition of wasting food and the command to share take precedence in terms of strength. Religious teachings or religiosity can reduce food waste and encourage adherents to consume more responsibly (Elhoushy & Jang, 2021; Elshaer et al., 2021). Religion can raise awareness of the negative consequences of food waste. Furthermore, religious norms that encourage variety can lead to less food waste; consumers with a higher level of religiosity tend to waste less food (Minton et al., 2019). Sharing behavior can also help reduce food waste because excess food is distributed to those in need rather than being wasted (Lazell, 2016). To maximize this aspect of strength, campaigns and socialization of Muslim households regarding the teachings of sharing, such as zakat, infaq, alms, waqf, and food sharing, are required. Many verses and hadiths command us to share food with the poor, orphans, and captives (Q.S. Al-Insan: 8) and forbid us to throw food away (Q.S. Al-Isra: 26-27). Donations through social services, in addition to sharing food, can help reduce negative food waste behavior (Pellegrini et al., 2019). Sharing is the key to reducing food waste, and Islam strongly promotes the sharing of both food and wealth.

The management of household food demands is next in importance. Food waste can be decreased in homes with effective food management (Pellegrini et al., 2019). When households properly manage their food demands, both shopping and cooking are customized to household needs, such as not cooking excessively, purchasing and cooking the preferred food, and reducing the quantity of food waste (Krisjanti & Quita, 2020). Campaign activities, socialization, and education can be conducted to manage household food needs as best as possible. In the majority of homes, cooking food for family members is the second priority. Families can prepare food according to their preferences and the number of household members by cooking for themselves, thereby reducing the amount of food wasted. How food behaviors are regulated in terms of shopping, preparing meals, and controlling food waste can be related to sustainability and the environment (Gojard & Véron, 2018). When low-income families prepare meals, they can cut costs further and provide them with a healthier and more nutrient-rich diet (Pooler et al., 2017).

Most homes have refrigerators to store their food properly, which is the last priority from the perspective of power. The presence of a refrigerator in a home is a sign of overall affluence (Alabshar et al., 2021). Effective food storage will lower food waste (Masson et al., 2017). Defrosting ice serves the primary purpose of preserving the quality and shelf life of food and beverages. However, refrigerator storage strategies and procedures are also crucial for maintaining the quality of foods and

beverages (Jaelani et al., 2014). Some foods can last a long time, and some foods go bad or rotten rapidly; thus, the way food is stored in the refrigerator depends on the quality of each food (Muhammad, 2021). Even in a refrigerator, food harm can result from improper food storage practices (Nastiti, 2020). Training and education for homes on basic food storage practices will enable them to store food and beverages in refrigerators. Good packaging practices can lessen food waste, in addition to the usage of refrigerators (Poyatos-Racionero et al., 2018). Food may be kept fresh longer and retain the integrity of its nutritional value with proper packaging.

b. The Priority of Weakness Aspect

With a rater agreement of 0.274, the first indicator of household weakness was a lack of knowledge about the negative effects of food waste behavior. The second indicator is consumption behavior, followed by a rater-agreement of 0.264, a lack of skills in managing food waste, a rater-agreement of 0.248, and finally, a rater-agreement of 0.214, indicating that food vendor promotions persuade many households.

Figure 3. Priority of Weakness Aspect

The household's greatest problem is its ignorance of the harmful impacts of food waste, which prevents it from realizing how its actions while disposing of food affect the environment, economy, food security, and other factors. The practice of reducing food waste in consumption can be aided by knowing the effects of food waste (Silvennoinen et al., 2014). Food waste will be reduced as a result of increased

awareness of its negative effects of food waste on the environment, economy, and sustainability (Min et al., 2021). Lack of food knowledge results in two negative effects: first, more food is wasted; and second, consumers who are unaware of the risks of food may consume any food, even if it is unhealthy, putting their health at risk (Cattaneo et al., 2021).

Consumptive behavior is the household's second vulnerability. Many corporate actors offer food and beverages with a variety of sorts, flavors, and prices, contributing to a more consumptive lifestyle, along with the rise of communication and information media. Consumptive behavior encourages people to spend more money on food and beverages (Koivupuro et al., 2012), which leads to an abundance of food and increases food waste (Burlea-Schiopoiu et al., 2021; Szakos et al., 2021). Consumptive behavior influences the amount of plastic trash that is disposed of, as well as the amount of food waste (Pramanti & Chotim, 2019). Islam prohibits excessive or consumptive eating and purchasing habits (Q.S. Al-Furqan: 67).

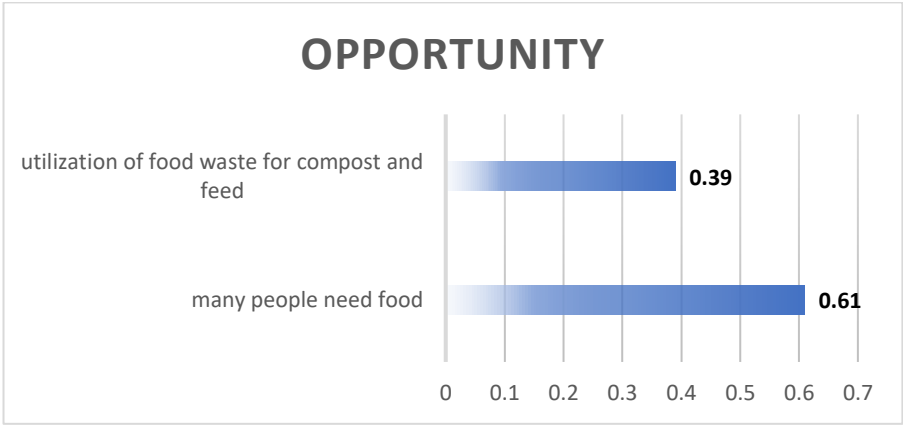
The third problem is the inability to appropriately manage food waste, which results in it being discarded. There is still relatively little understanding among households of how to separate and sort food waste from other types of garbage (Bernstad Saraiva Schott & Andersson, 2015; Bernstad, la Cour Jansen, et al., 2013). Government and commercial organizations or agencies must be actively involved in coordinating these activities by applying good technology to families to recycle organic and non-organic garbage (Refsgaard & Magnussen, 2009). To get households interested in recycling their food waste, there needs to be campaigning, socialization, and education (Bernstad et al., 2013b). Here, the significance of intervention by institutions or organizations to provide education to enhance food preparation planning skills and domestic food waste management is highlighted (Romani et al., 2018). Fourth, households are frequently persuaded by food vendors' and producers' promotional offers. Promotion may impact a product's sales volume (Suryani & Syafarudin, 2021). Customers are influenced to purchase things through advertisements and price reductions (Fahmi et al., 2020). Consumers will eventually be more liberal about the product brand if there are ongoing discounts and low prices (Mela et al., 1997).

c. The Priority of Opportunity Aspect

With a rater agreement of 0.610, respondents agreed that the high number of hungry, impoverished people presents an opportunity to curb home food waste, so

that surplus food might be donated to those in need. The second opportunity, with a rater agreement of 0.390, was the use of food waste for compost and animal feed.

Figure 4. Priority of Opportunity Aspect



The vast number of people in Indonesia who need food present an opportunity for households to donate food and money to those in need via zakat, infaq, alms, and other methods. Data from BPS 2020 show that Indonesia's poverty population rose from 1.13 million during the COVID-19 outbreak to 27.55 million (Badan Pusat Statistik, 2020). Sharing is one of the best methods to minimize food waste. Islam places a strong emphasis on social justice and the general good. The World Bank estimates that 800 million people, or 10% of the world's population, live in poverty (World Bank, 2019). One-third of the food produced worldwide is lost or squandered (HLPE, 2014).

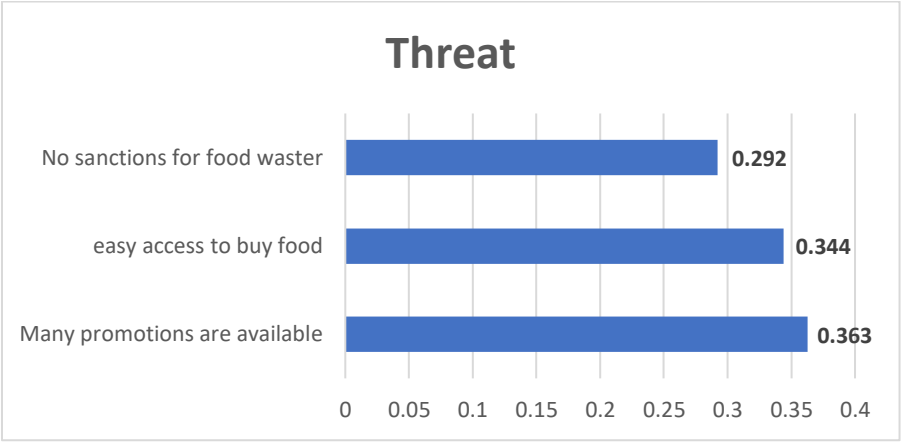
The use of food waste as compost and animal feed is the second top opportunity. An alternative to reducing environmental harm is to use food waste as animal feed (Qi et al., 2021; Wang et al., 2021). Utilizing food waste for animal and compost feed can help preserve nature and clean the environment (Huang et al., 2020). Additionally, because there is no food residue left that gives off an unpleasant smell or carries diseases, using compost made from food waste is beneficial for human health (Mu et al., 2017). Therefore, to make food waste useful, training in the management and composting of food waste is required. A Belgian waste management company called Public Flemish offers a step-by-step plan to manage food waste that includes the following steps: (1) Preventing food waste, (2) Reusing food for human nutrition, (3) Using it as animal feed, (4) Using it as a raw material in

the industry (bio-based economy), (5) Using it as fertilizer by anaerobic digestion or composting, and (6) Using it as renewable energy (Roels & Van Gijseghem, 2011). Waste treatment can reduce odors in the environment and greenhouse gas emissions (Cerda et al., 2018). Animals and humans are not harmed by the use of food waste as animal feed (Salemdeeb et al., 2017). Utilizing food waste is one method to minimize its negative effects.

d. The Priority of Threat Aspect

The quantity of promotions offered by food producers, with a rater agreement value of 0.363, had the highest threat level priority. Massive promotions attract many customers to buy large quantities of food, which leads to the second threat of easy access to food, which has a rater agreement of 0.344, and the third threat, which has a rater agreement of 0.292, with no penalties for homes that throw food away. This demonstrates how persistent promotions and advertising by producers and traders can influence consumer behavior in families, causing households to purchase more food and beverages.

Figure 5. Priority of Threat Aspect



Promotion has a significant impact on how many people buy the product (Katrin & Setyorini, 2016). The abundance of food promotions that retailers provide is one risk factor for food waste behavior (Le Borgne et al., 2021). According to Tsalis, many promotions make consumers desire to buy more food, and occasionally they do not buy what they need (Tsalis et al., 2021). One medium frequently used to advertise

products and services is social media. Promotional efforts on social media can boost food sales (Diyatma & Rahayu, 2017). On the one hand, this is advantageous for farmers and dealers, but because so much food is wasted, it is not advantageous for environmental sustainability.

Food that is simple to obtain poses a secondary threat. It has been simpler for consumers to receive different types of meals that may be purchased through readily available applications, thanks to the rise of information and telecommunications media. Low food costs and easy availability of food threaten consumer behavior and affect how much food is wasted (Barrera & Hertel, 2021; Bellemare et al., 2017) whereas rising food prices may affect the elasticity of food demand (Barrera & Hertel, 2021). Consequently, it is essential to have a food pricing strategy at the seller level.

Consumers do not feel bad about tossing food away because there are no penalties for those who waste food. According to research conducted in the UAE, restaurant managers can reduce food waste in their establishments by receiving subsidies and fines (Pirani & Arafat, 2016). Reducing the amount of food wasted through subsidy programs and penalties for food waste producers has been successful (Yang et al., 2021). Food waste prevention regulations must be implemented in the form of rewards and penalties, as well as facilities for purchasing instruments to control food waste and offering incentives to social institutions that help reduce and utilize food waste.

Priority Strategy for Food Waste Prevention in Moslem Households

Growing middle classes in developing nations raise consumer demand for nutrient-dense foods, including meat, fruits, and other foods (Dobermann & Nelson, 2013). As a result, the food supply system is put under even more stress, together with extremely high rates of population increase in the least developed nations. The state responds by increasing food production and managing and preventing food waste (Garcia-Garcia et al., 2015). Meanwhile, food waste among consumers and households has become an issue for industrialized nations (Falcone & Imbert, 2017), and if it is not adequately addressed, it could have serious consequences for the global population. Prevention measures for food waste must include both internal and external components, including producer and government policies, in addition to consumers' internal efforts.

Food waste is largely a result of unfavorable routines and habits (Lazell, 2016), although changing one's behavior can help reduce food waste (Shove, 2010). However, to reduce food waste behavior, behavior change alone is ineffective; it must be combined with rules that can prevent food waste behavior (Moloney & Strengers, 2014). According to experts and food waste actors, the following techniques can help reduce food waste.

Figure 6. Priority of food waste prevention strategies in the household

With a rater agreement of 0.242 respondents, sharing food with those in need should be the household's top priority when trying to prevent food waste. The most crucial internal tactic to reduce food waste is this one. Given that there are still many hungry people in Indonesia, there is a chance to help those in need by donating extra food. Sharing is a good method to reduce food waste (Midgett et al., 2018). Sharing can also help maintain food security. Furthermore, sharing is crucial for achieving the Sustainable Development Goals (SDGs), particularly the objectives of ending hunger and poverty. By gathering extra food from customers and retailers and fostering cooperative consumption models, sharing practices are being created in certain nations, including the US and Europe. A Food Bank Indonesia institution and a Food Bank Baznas exist in Indonesia as well; however, there are not many of them and they are not widely dispersed. The sharing economy introduces us with a new way of thinking that is primarily centered on economic and environmental efficiency. Sharing meals can result in resource efficiency and, in a more specific context, can help reduce the amount of food waste produced (Swannell et al. 2019;

Falcone & Imbert, 2017). Engaging in sharing activities can help college students stop wasting food (Lazell, 2016). Giving charities can help cut down food waste (Piras et al., 2021; Stangherlin et al., 2019; Pellegrini et al., 2019). The benefit of those who share is doubled by Allah with a reward of 700 times or more (Q.S. Al-Baqarah: 261), which is why sharing is strongly encouraged by all religions, notably Islam.

The second external technique is to raise awareness of the negative effects of food waste on the environment, resources, economy, health, and other factors. Campaign and socialization had a rater agreement value of 0.225. Both directly to the community through community leaders and social media, campaigns, and socializing activities can be conducted. A campaign against food waste will raise awareness, which will lead to a decrease in behavior (Szakos et al., 2021). Consumers can reduce food waste through campaigns and outreach (Kim et al., 2020). Additionally, advertisements highlighting the detrimental effects of food waste on the ecosystem can help reduce food waste (Pinto et al., 2018). Interventions that psychologically alter household behavior can reduce food waste (Schmidt, 2016). Increased student awareness of proper food storage practices has implications for lowering food waste (Manomaivibool et al., 2016). Food waste prevention education and campaign warnings of its dangers are uncommon in Indonesia. This is due to the dearth of organizations and agencies dedicated to combating food waste and raising awareness of its effects on the environment, economy, health, and food security of a nation. Campaigns to reduce and avoid food waste can be carried out by departments that are related, such as the Department of Agriculture, the environment, and community organizations.

The third strategy is a domestic strategy that involves regular grocery shopping and cooking. To reduce food waste in families, foods with a rater agreement value of 0.201 should not be overcooked or overspent. A large amount of food waste results from having too much food kept, which causes it to spoil or expire, and ultimately to be squandered. Food waste can increase because of routine purchasing and poor food preparation (Aschemann-Witzel et al., 2015). Therefore, routine shopping and cooking are the first steps in the food waste process (Stefan et al., 2013). Unneeded can result in a lot of food being wasted and going bad. One tactic for decreasing food waste is to manage purchasing and preparation (Stancu et al., 2016).

With a rater agreement value of 0.181, the fourth external strategy was to educate people on the handling, storing, and management of food additives. Food waste can be decreased by improving culinary abilities and food storage knowledge (Kasavan et al., 2021; Painter et al., 2016). Youth education is also necessary since it

can help minimize food waste because children and teenagers waste food more frequently (Wojciechowska-Solis & Magdalena, 2020).

The last external strategy, with a rater agreement value of 0.151, was the existence of laws on food waste. Both municipal and federal governments have enacted laws to limit food waste. Policies for managing food waste must be based on the 3R idea, which refers to reducing, reusing, and recycling (Memon, 2010). Farmers, traders, and households must first implement policies to prevent food waste. Farmers with effective post-harvest management, traders with food storage, and sales of non-only high-quality food items, particularly in supermarkets, and homes with no food waste. Additionally, consumers must be prepared to consume any leftover food that is still edible (reuse), and if any food cannot be reused, it must be recycled for use in compost and animal feed. Each region can implement reward and punishment systems to encourage residents to conserve the environment and reduce food waste.

There must be policy changes to limit the quantity of food waste because residents of large cities contribute more to it. Reducing food waste through community-based initiatives and public-private partnerships (Secondi et al., 2015). Fiscal policies are less effective than regulations, programs, and strategies when it comes to reducing the amount of food waste produced by households (Chalak et al., 2016). However, not every policy implemented has been successful in lowering food waste. Food waste can be decreased through the use of policy measures, education, incentives, information, and shared commitment (Schmidt, 2016). Economic policy instruments, such as raising food prices that can deter consumers from purchasing food in large quantities, can be taken into consideration. However, not all policies are effective in considerably reducing food waste (Garske et al., 2020).

Conclusion

The prevention of food waste behavior begins with behavior change. The primary internal strategy for households to reduce food waste is by sharing food with those in need. Sharing also contributes to achieving the SDGs, specifically by reducing hunger and poverty. The other internal strategy is for households to practice wise shopping and cooking, avoiding over-purchasing and over-preparing food. Food waste can be minimized through mindful shopping and cooking habits. Externally, the government, agencies, and community organizations should campaign and raise awareness about the negative impact of food waste, as increased knowledge leads to less food being wasted. The next external strategy is to provide

education on food processing, storage, and management, which should be implemented by agencies and communities. Lastly, the final external strategy involves policies or regulations at all levels related to the prevention and management of food waste. Sharing food is the top priority in household strategies for preventing food waste and can significantly reduce the amount of waste produced. Therefore, it is essential to encourage the establishment of institutions, such as food banks, that can collect and distribute surplus food, as well as organizations that can convert food waste into energy, compost, and animal feed.

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