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Article

Investigating household food waste in Indonesia: An extended norm activation model

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Abstract: Consumers waste significant amounts of food. Food waste presents a substantial problem for the environment, society and economy. Addressing the food waste challenge is crucial for fostering sustainable behavior and achieving the Sustainability Development Goal 12.3 agenda. Norms are a significant determinant in motivating consumers to prevent food waste and could be activated by other factors. Religiosity has the potential to influence norms related to food waste behavior. This study investigated how religiosity affects the intentions of consumers to minimize food waste. The interplay of religiosity, personal norms, subjective norms, and intention to avoid food waste was examined by the extended norm activation model. Data were obtained from Muslim consumers in Indonesia. Structural equation modeling evaluation showed that religiosity positively affects the intention to prevent food waste. The intention to avoid food waste is more closely associated with personal norms compared to subjective norms. Personal norms mediate the religiosity and food waste reduction intention relationship. Consumer awareness activates personal norms by making them feel accountable for food waste's negative impact. These findings provide insights to stakeholders in developing policies to mitigate the food waste issue.

Keywords: food waste; religiosity; norms; awareness; responsibility; intention

1. Introduction

Consumers contribute significantly to the generation of food waste (FW). UNEP (2021) reported that 17% of total food available is thrown away at the consumption stage. Contrary to previous studies, which primarily recognized FW as a phenomenon in developed countries, FW issues are equally prevalent in developing countries because per capita FW produced in households is typically similar across different income levels (Boon and Anuga, 2020; Chalak et al., 2018; Nicastro and Carillo, 2021; UNEP, 2021). Indonesia is likewise confronting this problem. A study revealed that FW in Indonesia increased from 39% in 2000 to 55% in 2019, approximately 5–19 million tons per year, mostly occurring at consumer levels (Bappenas, 2021). FW has serious environmental consequences, accelerating climate change, depleting natural resources, and contributing to biodiversity loss (Cheng and Leong, 2023). The estimated total food loss and waste generated emissions account for an average of 7.29% of Indonesia's annual greenhouse gas emissions, of which 77% come from FW (Bappenas, 2021). Furthermore, these emissions cost the country 4% to 5% of its gross domestic product, despite having the ability to feed at least 61 million people (Bappenas, 2021). On the other hand, the Indonesian government allocated a food subsidy for the impoverished, aiming to assist 17.5 million households with an annual budget of $1.5 billion (Banerjee et al., 2018). Therefore, it is crucial to focus on

changing consumer behavior to address the issue of FW and develop sustainable behavior. This aligns with the target of the UN's Sustainability Development Goal 12.3 to reduce FW at consumer and retail levels (UN, 2015).

Studies have established that norms are a significant determinant in motivating consumers to minimize FW. A systematic literature review found that personal norms (PN) and subjective norms (SN) widely used to investigate consumers' motivation to avoid FW (Vittuari et al., 2023). If PN is associated with an individual's motivation to involve in a certain behavior, then SN refers to the influence of societal pressure (Ajzen, 1991; Koklic et al., 2019). However, PN does not stand alone and could be influenced by other factors to motivate consumers to avoid FW. Few studies have examined factors that drive PN related to FW reduction intention, such as informal education, cultural values, and food religious values (Filimonau, Matute, et al., 2023; Filimonau, Mika, et al., 2022; Long et al., 2022). Similarly, SN could be activated by perceived value in sustainability, to motivate intention to prevent FW (Kim et al., 2020). To better understand the FW intention, more studies are needed to examine the various psychographic/psychological factors affecting PN as well as SN (Filimonau, Coşkun, et al., 2023; Heidari et al., 2020).

Religious values have the potential to be a psychographic/psychological factor influencing FW generation (Filimonau, Mika, et al., 2022). Research has recognized religious beliefs as determinants of behavior in food consumption. For example, Muslims and Jews pay attention to their food choices in order to adhere to the religious teachings (Regenstein et al., 2003; Santovito et al., 2023). Food is permissible for consumption by Muslims if it is Halal certified, ensuring, for instance, the absence of ingredients in pork derivatives, and by Jews if it is Kosher certified, guaranteeing, for instance, the wine is produced in accordance with Jewish regulations (Eliasi and Dewyer, 2002). Muslims are prohibited from consuming alcohol while Jews and Christians are allowed to do so in accordance with the dietary laws of their respective religions (Tieman and Hassan, 2015). Furthermore, Hindus avoid consuming beef due to the cow's sacred status, while Orthodox Buddhists and monks refrain from consuming meat and fish in deference to the sanctity of life (Kwon and Tamang, 2015).

Few studies have employed religiosity as a factor influencing norms that affect FW behavior. Employing Theory of Planned Behavior, Elshaer et al. (2021) and Elhoushy and Jang (2021) investigated the interaction between religiosity and FW intention in Saudi Arabia and Egypt, respectively. Elshaer et al. (2021) found religiosity could reduce the intention to generate FW by reinforcing SN, while Elhoushy and Jang (2021) argued that SN plays an insignificant mediating role in such relationship. These competing findings necessitate more studies to investigate the interplay between religiosity, norms, and FW intention.

In conclusion, limited studies have examined the factors that influence norms on FW preventing at the consumer level. Specifically, there is limited understanding on how religiosity shapes PN and SN of consumers for FW reduction intention. Religion underscores the responsible utilization of resources and the prevention of environmental degradation (Hwang, 2018). This study assumes that people with higher levels of religiosity may increase the intention to avoid FW due to their compliance with religious tenets.

This study employed the norm activation model (NAM) and incorporated with religiosity and subjective norm (SN) to examine how religiosity affects PN and SN towards the intention to prevent FW. NAM was used because it includes the personal norms (PN), a fundamental component of this study's conceptual framework. Empirical studies have established that PN is a crucial element in influencing pro-environmental consumer behavior (Han et al., 2016; Van Der Werff and Steg, 2015). Preventing FW constitutes pro-environmental behavior due to its advantageous environmental effects (Quested et al., 2013). NAM offers a comprehensive understanding of the fundamental mechanisms driving individuals' pro-environmental behavior by highlighting the significance of cognitive processes and normative factors (De Groot and Steg, 2009). Its accountability makes it a crucial theory for understanding how people will act in ways that benefit the environment (Han et al., 2020; Onwezen et al., 2013). Religiosity can influence intention directly or indirectly through factors such as personal and subjective norms. This study investigates the mediation role of these factors in the relationship between religiosity and intention to minimize FW.

2. Literature review

2.1. Norm activation model (NAM)

NAM is a framework used to understand the factors affecting behavior (Schwartz, 1977). The NAM posits that consumers develop personal norms (PN) through awareness of consequences (AC) and ascription of responsibility (AR) for their actions (Schwartz, 1973). AC pertains to an individual's understanding of potential negative effects of choosing not to engage in certain behaviors (De Groot and Steg, 2009). AR is the act of feeling responsible for damaging outcomes that arise from the omission to partake in a particular behavior (De Groot and Steg, 2009). FW contributes significantly to environmental and socioeconomic issues. Reducing FW benefits both the environment, society and economy. Therefore, consumers' awareness and responsibility for the adverse impact resulting from FW will make them more likely to participate in behavior to prevent FW.

PN refers to the moral commitment of an individual to contribute or not in a certain behavior (Schwartz and Howard, 1981). This normative factor plays a significant determinant in motivating pro-environmental consumer behavior (Shin et al., 2018; Van Der Werff and Steg, 2015). Individuals adhere to PN not because of fearing of societal sanctions but to prevent experiencing emotional states such as shame, regret, and humiliation (Schwartz and Howard, 1981). Consumers may feel ashamed or guilty if they waste food and violate societal norms (Djekic et al., 2019). Consequently, reducing FW makes them feel positive and avoid negative emotions (Onwezen et al., 2013). Empirical evidence demonstrated that PN positively affects intention to prevent FW (Filimonau, Coşkun, et al., 2023; Obuobi et al., 2024).

NAM framework can demonstrate the factors affecting PN in two ways: first, by examining them sequentially, where AC affects AR, which in turn influences PN; or second, by viewing these factors as predictors of PN (Kim et al., 2022). Studies found that AC positively affect responsibility as well as PN to prevent FW (Obuobi et al.,

2024). Furthermore, empirical research also found that AR activates PN to avoid FW (Filimonau, Coşkun, et al., 2023; Obuobi et al., 2024).

Prior studies have revealed conflicting perspectives, with each viewpoint being supported by theoretical foundations and empirical research (Shin et al., 2018). Therefore, this study chooses the mediation model to encompass both perspectives and proposes the hypotheses:

H1: AC positively influences consumers' AR.

H2: AC positively affects consumers' PN.

H3: AR positively influences consumers' PN.

H4: PN positively affects consumers' intention to reduce FW.

2.2. Subjective norms (SN)

NAM provides the chance to extend the framework by incorporating more variables into the model (Filimonau, Coşkun, et al., 2023). Therefore, some studies have extended or modified the NAM to better understand and predict pro-environmental contexts, including in FW studies (Confente and Scarpi, 2021; Kim et al., 2022; Si et al., 2022; Wang et al., 2022). This study integrated SN into NAM as it pertains to the influence of social pressure to reduce FW. SN complements the PN associated with an individual's motivation to reduce FW. Studies have shown that SN significantly predicts intentions to reduce FW (Wang et al., 2023; Wu et al., 2023).

SN influences a decision of a consumer to participate or not in a specific behavior (Ajzen, 1991). The perception of approval or disapproval from significant others about FW influences a consumer's likelihood of engaging in an activity to avoid it. SN is more important where society lives in collectivism than individualism (Minton et al., 2018). This study was carried out in Indonesia, a typical collectivist country (Kurniati et al., 2020). Therefore, the following hypothesis is proposed:

H5: SN positively affects consumers' intention to reduce FW.

2.3. Religiosity and norms

This study incorporated religiosity into NAM, since it has an important role in shaping individuals' behavior to avoid FW (Filimonau, Kadum, et al., 2022; Heidari et al., 2020). Religiosity is a commitment to follow the principles established by a religion and it describes how much an individual follows, values, and practices religious beliefs every day (Worthington et al., 2003). The religion principle emphasizes responsibly using resources and preventing environmental exploitation (Hwang, 2018). The religiosity has a strong inclination towards pro-environmental behavior for Catholic consumers (Felix and Braunsberger, 2016). Another study also found that religiosity of Islamic believers affects their pro-environmental behavior (Rice, 2006).

Empirical studies found mixed results about the impact of religiosity on FW reduction intention. Minton et al. (2020) revealed that religious value influences FW behavior of American. In contrast, Elshaer et al. (2021) found insignificant effect of religiosity to consumers' intention to prevent FW in Saudi Arabia. Meanwhile, qualitative study by Filimonau, Kadum, et al. (2022) in Iraq found a weak association between religiosity and FW behavior, while study of Chammas and Yehya (2020) in

Lebanon found a significant relationship. A recent study found that religiosity influences Muslims' intention to avoid FW, whereas Christians did not exhibit any such effect (Baran et al., 2024). More studies are needed to investigate the association between the religiosity and FW intention (Elshaer et al., 2021).

FW is prohibited by religion (Minton et al., 2020). Religion emphasizes responsibly using resources and preventing environmental exploitation (Hwang, 2018). Adherence to religious principles encourages religious people to have a moral obligation to avoid FW. Throwing away food might make a religious person feel guilty because it goes against God's order (Elhoushy and Jang, 2021). Furthermore, religion fulfils individuals' needs for affiliation (Ysseldyk et al., 2010). A religious group can influence religious beliefs and perceptions of societal norms (Ullah et al., 2024). Protecting resources and the environment, created by God, is an obligation for all believers. A religious person may be compelled to minimize FW from a compliance standpoint by adhering to religious obligations and/or emulating the behaviors of fellow believers (Elhoushy and Jang, 2021). Therefore, the following hypotheses are proposed:

H6: Religiosity affects consumers' intention to reduce FW.

H7: PN mediates the religiosity and consumers' intention to reduce FW relationship.

H8: SN mediates the religiosity and consumers' intention to reduce FW relationship.

Religiosity is reflected by belief and commitment to practice the religion rules (Mohd Dali et al., 2019). As a result, religiosity is a second-order construct with two first-order constructs (the belief dimension and the commitment and practice dimension). The constructs and hypotheses proposed above are graphically illustrated in **Figure 1**.

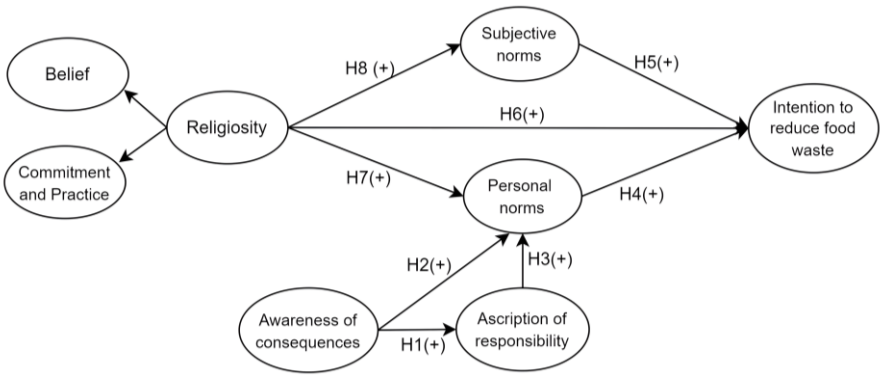

Figure 1. Conceptual framework.

3. Methods

3.1. Study context

This study was carried out in Indonesia, home of 281 million population (BPS, 2022). Religion prohibits wastefulness, yet Indonesia, a Muslim majority country, generates a significant amount of FW, around 20 kg to 77 kg per capita annually (Fernando et al., 2023; UNEP, 2024). This study was conducted at the consumer level

in the household, as they significantly contribute to the FW problem (UNEP, 2021). This justifies the study's focus on Muslim consumers in Indonesia in an effort to overcome the FW issue and create sustainable behavior.

3.2. Instrument design

The first section of the questionnaire comprised demographic data about the respondents. The second part involved measuring the constructs. The measures for AC, AR, and PN, each consisting of 3 items, were adopted from Filimonau, Coşkun, et al. (2023). The measures for SN (4 items) and FW reduction intention (4 items) were adapted from Coşkun and Yetkin Özbük (2020) and Elshaer et al. (2021), respectively. Religiosity was measured by two dimensions of Islamic religiosity: the first one is the belief dimension (6 items), and the second one is the commitment and practice dimension (11 items), adapted from Mohd Dali et al. (2019). A measurement of Islamic religiosity was used since this study was conducted on Muslims in Indonesia. This scale provides a unique opportunity to enhance understanding of how Muslims' religiosity influences their intention to prevent FW. Each item was assessed on a five-point Likert-type scale (1 = strongly disagree, 5 = strongly agree).

3.3. Data collection

Data were collected online from January to March 2024 using convenience sampling techniques. The medium for the collection was a Google Form, whereby the link to the form was distributed to respondents via WhatsApp. The self-administered questionnaire began with a brief description of the study. Respondents filled out the questionnaire voluntarily. Those who refused to fill it out can ignore the questionnaire. Meanwhile, respondents who agreed to participate can proceed to fill in the questions. This study ensures the anonymity of the participant's responses.

This study applied structural equation modelling (SEM) to analyze the data. The minimum sample size required for SEM is 200, or 200 to 400 for models of moderate complexity (Kline, 2023; Wolf et al., 2013). Kline (2023) also recommends that at least the sample size is ten times the estimated parameters. Initially, 673 respondents participated in the survey, particularly from West Sumatra, which possesses profound Islamic cultural foundations (Sakai and Fauzia, 2014). This province is known as a religious area, which has the motto that all cultural activities must be based on Religion tenets (Abror et al., 2020). Following cleaning, 564 valid samples were found. Since this study has 34 parameters, its sample size met the recommendations.

Out of 564 valid samples, 317 (56.2%) are males and 247 (43.8%) are females. The highest age range was 26–35 years (36.3%), followed by the age group of 18–25 (29.1%). The generations Y and Z respondents, who represent a substantial proportion of the Indonesian population, dominated the responses (The British Council, 2022). Most respondents hold either a diploma or bachelor's degree (57.1%), followed by those who had completed high school or below (36.7%). Employed (51.1%) and self-employed (16.8%) were the most commonly found categories of occupation. **Table 1** presents the valid sample descriptive statistics.

Table 1. Respondents profile.

Variable	*N*	%	Variable	*N*	%
Gender			Marital Status		
Female	247	43.8	Single	206	36.5
Male	317	56.2	Married	358	63.5
Age			Occupation		
18 to 25	164	29.1	Student	78	13.8
26 to 35	205	36.3	Employed	288	51.1
36 to 45	100	17.7	Self-employed	95	16.8
46 to 55	81	14.4	Retired	1	0.2
> 55	14	2.5	Housewife	71	12.6
Educational Level			Etc.	31	5.5
High School or below	207	36.7			
Diploma and Bachelor's Degree	322	57.1			
Postgraduate Degree	35	6.2			

3.4. Data analysis

Data analysis was first evaluated using a common method bias (CMB) assessment because all constructs were measured in one survey and utilizing the same response technique (Kock et al., 2021). Then, using confirmatory factor analysis (CFA), the measurement model was evaluated to verify the construct's reliability and validity. Lastly, structural equation modelling (SEM) was performed to assess the hypotheses. This study investigated the direct influence of religiosity on intention to minimize FW, and how PN and SN mediate the relationship between those factors. Therefore, SEM is suitable because it allows for the simultaneous analysis of multiple variables by estimating complex relationships among constructs and indicators (Hair et al., 2021). All the variables in this research were measured based on a five-point Likert scale, which represent categorical data of an ordinal scale. However, SEM can treat an ordinal variable as continuous if it has more than four categories and the data approximate a normal distribution (Bentler and Chou, 1987; Byrne, 2016). CMB was assessed using SPSS 24, while CFA and SEM were analyzed using AMOS 24.

4. Result

4.1. Common method bias

Common method bias (CMB) was evaluated by employing Harman's one-factor test. The main component factor analysis extracted a single factor from all items assessing the constructs. The test resulted in a value of 41.39%, which is lower than 50% of the acceptable level (Podsakoff et al., 2003). Consequently, the results are unlikely to be affected by CMB.

4.2. Measurement model evaluation

Confirmatory factor analysis was used to assess the measurement model fit to the data and establish the reliability and validity. Following standard practice, the low

factor loadings are eliminated from further analysis since they do not accurately measure the corresponding construct (Anderson and Gerbing, 1988). The loading lower than 0.5 is recommended to be deleted (Hair et al., 2019). The fit achieved after removing three items of the belief construct (Bel1, Bel2, and Bel4), two items of the commitment and practice construct (Co1 and Co11) and one item of the intention construct (Int3) due to their poor factor loadings. Consequently, the fit of measurement model has adequate goodness-of-fit (chi-square = 979.592, df = 333, chi-square/df = 2.942, RMSEA = 0.059, SRMR = 0.0606, CFI = 0.935, TLI = 0.926, IFI=0.935).

All of the constructs' composite reliability (CR) and Cronbach's alpha (CA) values are greater than the recommended cutoff of 0.7. These values show the adequate internal consistency of the measures for each construct (Hair et al., 2019). The average variance extracted (AVE) for all the constructs exceeded the required threshold of 0.5, indicating that the measures for each construct are valid and convergent (Hair et al., 2019). Furthermore, the two first-order constructs (the belief and the commitment and practice) reflect the religiosity as a second-order construct and confirm the internal consistency and convergent validity of their measures. **Table 2** presents the evaluation result of the measurement model of two first-order of religiosity construct, whereas **Table 3** displays all of the main constructs.

Table 2. Reliability and validity of first-order constructs of religiosity.

Construct	Item	Factor Loading	*t*-value	CA	CR	AVE
Belief	Bel3	0.554	12.364	0.729	0.762	0.522
	Bel5	0.816	†			
	Bel6	0.771	16.842			
Commitment and practice (CoPr)	Co2	0.648	14.767	0.911	0.903	0.509
	Co3	0.696	15.868			
	Co4	0.715	16.311			
	Co5	0.785	17.914			
	Co6	0.729	16.638			
	Co7	0.664	†			
	Co8	0.686	15.649			
	Co9	0.804	18.369			
	Co10	0.675	15.385			

Note: † Items fixed to 1 in CFA.

Table 3. Reliability and validity evaluation of main constructs.

Construct	Item	Factor Loading	*t*-value	CA	CR	AVE
Awareness of consequence (AC)	AC1	0.866	21.656	0.853	0.855	0.663
	AC2	0.792	19.649			
	AC3	0.782	†			
Ascription of responsibility (AR)	AR1	0.769	†	0.838	0.839	0.634
	AR2	0.830	19.524			
	AR3	0.789	18.617			

Table 3. (*Continued*).

Construct	Item	Factor Loading	*t*-value	CA	CR	AVE
Personal norms (PN)	PN1	0.824	23.906	0.822	0.850	0.661
	PN2	0.904	27.6			
	PN3	0.848	†			
Subjective Norms (SN)	SN1	0.800	21.125	0.890	0.894	0.738
	SN2	0.696	17.623			
	SN3	0.857	†			
	SN4	0.690	17.421			
Intention (Int)	Int1	0.888	†	0.868	0.848	0.584
	Int2	0.915	29.169			
	Int4	0.597	15.577			
Religiosity (Rel)	Belief	0.769	19.657	0.801	0.805	0.674
	CoPr	0.870	19.657			

Note: † Items fixed to 1 in CFA.

The AVE's square root for each surpasses its correlation with other constructs as well as the highest correlation with its associated construct, confirming the construct discriminant validity, as displayed in **Table 4** (Fornell and Larcker, 1981). Furthermore, discriminant validity of HTMT criteria is also established since all of the ratios are less than 0.9, indicating that the measures have adequate discriminant validity, as presented in **Table 5** (Kline, 2023).

Table 4. Discriminant validity (Fornell–Larcker criterion).

	AC	AR	PN	SN	Int	Rel
AC	0.814					
AR	0.782	0.796				
PN	0.780	0.759	0.859			
SN	0.689	0.653	0.749	0.764		
Int	0.750	0.643	0.782	0.678	0.813	
Rel	0.576	0.533	0.607	0.623	0.552	0.821

Table 5. Discriminant validity (HTMT ratio).

	AC	AR	PN	SN	Int	Rel
AC						
AR	0.783					
PN	0.781	0.760				
SN	0.664	0.629	0.721			
Int	0.757	0.648	0.789	0.658		
Rel	0.578	0.535	0.608	0.601	0.557	

4.3. Structural model evaluation

SEM evaluation was conducted to assess the proposed hypotheses. The overall assessment demonstrates that the model has an acceptable fit (chi-square = 1088.311, df = 339, $p < 0.001$, chi-square/df = 3.210, RMSEA = 0.063, SRMR = 0.0755, CFI = 0.925, TLI = 0.916, IFI = 0.925). Awareness of consequences positively affects consumers' ascription of responsibility (b = 0.803, t-value = 15.421, $p < 0.001$), supporting H1. However, there is no significant influence awareness of consequences on consumers' personal norms (b = 0.122, t-value = 1.090, p = 0.276), thereby rejecting H2. Ascription of responsibility positively influences consumers' personal norms (b = 0.291, t-value = 4.468, $p < 0.001$). Therefore, H3 is supported. Personal norms significantly influence intention to reduce FW (b = 0.376, t-value = 3.967, $p < 0.001$), supporting H4. Nevertheless, the effect of subjective norms on consumers' intention to reduce FW is not significant (b = −0.093, t-value = −0.777, p = 0.437), thus H5 is rejected. Religiosity positively affects consumers' intention to avoid FW (b = 0.575, t-value = 3.263, $p < 0.001$), supporting H6. **Figure 2** and **Table 6** report the hypothesized relationships test of this study.

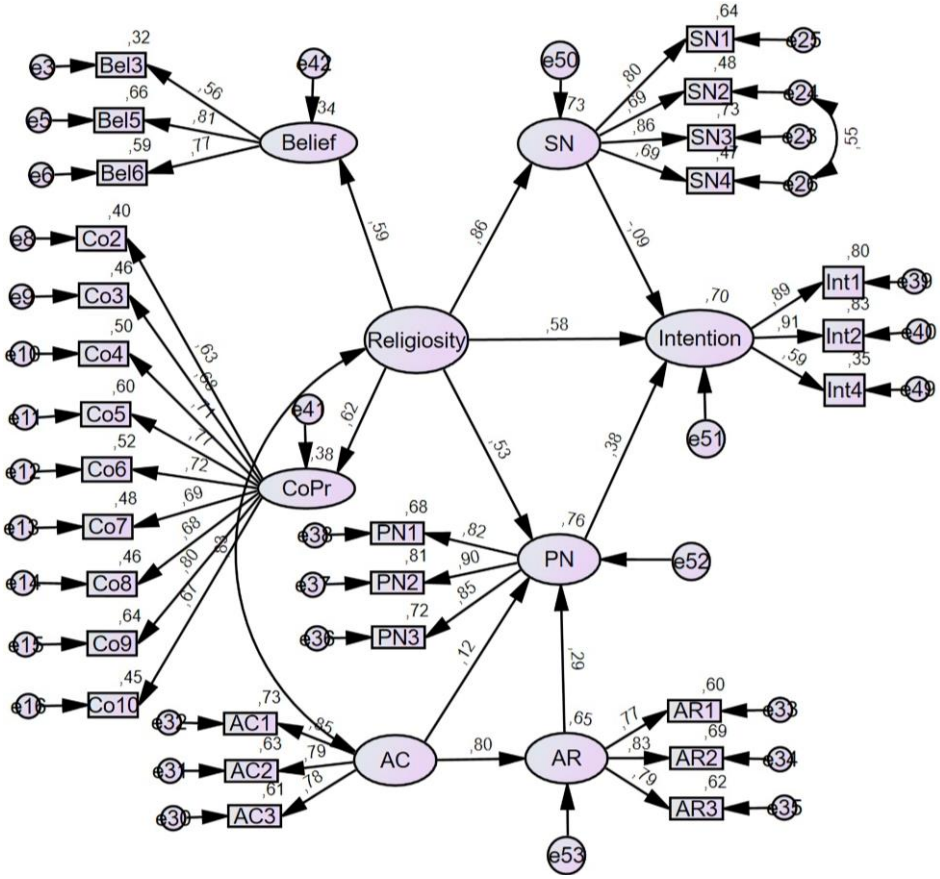

Figure 2. Structural model.

Table 6. Path coefficients.

Hypothesis	Path	Coefficient	*t*-value	*P*	Results
H1	AC → AR	0.803	15.421	***	Supported
H2	AC → PN	0.122	1.090	0.276	Rejected
H3	AR → PN	0.291	4.468	***	Supported

Table 6. (*Continued*).

Hypothesis	Path	Coefficient	*t*-value	*P*	Results
H4	PN → Intention	0.376	3.967	***	Supported
H5	SN → Intention	−0.093	−0.777	0.437	Rejected
H6	Religiosity → Intention	0.575	3.263	***	Supported

Note: *** $p < 0.01$ level of significant.

4.4. Mediation analysis

This study evaluated the mediating role of personal norms and subjective norms on the association between religiosity and intention to reduce FW. The result reveals a significant role of personal norms in mediating the relationship between consumers' religiosity and their intention to reduce FW ($b = 0.099$, $t = 2.106$, $p < 0.05$), supporting H7. Furthermore, the direct effect of religiosity on consumers' intention to minimize FW is also significant ($b = 0.575$, $p < 0.001$). Therefore, the relationship between religiosity and consumers' intention to minimize FW is mediated partially by personal norms. However, religiosity has an insignificant indirect effect on intention through subjective norms ($b = -0.039$, $t = -0.650$, $p = 0.409$). Therefore, H8 is rejected. **Table 7** summarized the results.

Table 7. Mediation evaluation.

Hypothesis	Relationship	Direct Effect	Indirect Effect	Confidence Interval		*P*-Value	Results
				Lower Bound	Upper Bound		
H7	Religiosity → PN → Intention	0.575***	0.099	0.018	0.172	0.031**	Partial Mediation
H8	Religiosity → SN → Intention		−0.039	−0.182	0.063	0.409	No Mediation

Note: *** $p < 0.01$, ** $p < 0.05$ level of significant.

5. Discussion

Using the extended norm activation model, this study investigated how religiosity influences consumers' intention to reduce FW. Awareness of consequences impacts ascription responsibility, which in turn affects personal norms. This provides evidence that once consumers gain a complete understanding of the negative impact of FW, they will develop a sense of responsibility, which in turn activates their moral obligation to take action to avoid it. Hence, increasing consumer awareness is an important step to deal with the FW issue at the consumer level.

The finding of this study established the significant influence of personal norms on consumers' intention to reduce FW. PN encourages consumers to finish their food rather than throw it away (Iriyadi et al., 2023). It makes consumers feel a sense of positivity (Onwezen et al., 2013). However, subjective norms have no significant impact on explaining the intention to avoid FW. This finding suggests that other people's opinions do not influence consumers' intentions to avoid FW more than individual moral commitment. This is aligned with a meta-analysis by Niemiec et al. (2020) confirming that combining personal norms and subjective norms with behavioral intention significantly diminished the influence of SN on intention.

This study provides evidence for the direct influence of religiosity on consumers' intentions to reduce FW. Higher levels of religiosity were positively associated with a

stronger intention to minimize FW. Furthermore, this study also examined the indirect effect of religiosity on intention to avoid FW. The finding revealed that personal norms mediate the influence of religiosity on consumers' intentions to prevent FW. This finding aligns with the study of Elhoushy and Jang (2021), which supports the argument of Fishbein and Ajzen (2010) that religiosity influences behavioral intentions through the mediation of other factors. However, the prediction of subjective norms as mediators of religiosity and intention relationships is not supported. It occurs because when personal norms are added to behavioral intention, it will reduce the effect of SN on intention (Niemiec et al., 2020). Therefore, consumers' intention to reduce FW is predominantly influenced by personal norms rather than subjective norms.

5.1. Theoretical implications

This study presents three contributions to the literature. Firstly, it underscored the significance of considering religiosity in future research on the psychographic/psychological factors influencing consumers' intentions to minimize FW. This study will be valuable in comprehending the significance of religiosity in predicting the intention to waste less food. Secondly, this study employed the Islamic religiosity scale to measure religiosity, given that the participants of this study identified as Muslim. It has the potential to be utilized or adapted in future studies conducted in a different country or community within the relevant context. Thirdly, the study established the relationship between religiosity and personal norms in order to decrease FW among consumers. The presence of religiosity can enhance personal norms, leading to a reduce FW intention. The efficacy of the model can be assessed in other studies regarding its ability to explain sustainable behavior.

5.2. Policy and managerial implications

This study offers practical implications for managing FW at the consumer level. From a policymaking and management standpoint, the study identified opportunities to implement social marketing interventions that aim to enhance the intention of consumers to reduce FW. The interventions should primarily focus on increasing awareness of the impact of FW. Emphasizing the negative consequences of FW could foster a consumer's sense of responsibility, leading to a moral obligation, which in turn improves the intention to reduce FW. Governments, communities, activists, and organizations could design effective awareness campaigns to encourage collective responsibility for the FW problems. For example, they could include educational activities or focusing on co-creation and digital technologies, that have shown to make participants much more aware of the FW issue (Casonato et al., 2023; Fraj-Andrés et al., 2023; Wharton et al., 2021).

From a religious perspective, religiosity can affect intention to avoid FW both directly or indirectly through personal norms. Islamic leaders can influence their followers by spreading the message that religious principles prohibit FW. Additionally, they can propagate religious teachings that forbid actions that harm the environment. In addition. Koehrsen (2021) argued that Islamic religious leaders have the potential to address global environmental problems, by fostering the awareness

within their communities. Policymakers can encourage them to take a proactive role in promoting FW reduction. This effort has the potential to increase awareness and strengthen the personal norm of avoiding FW behavior.

5.3. Limitation and future research directions

The generalizability of the current research findings is limited due to the utilization of a non-probability convenience sampling technique for data collection. In order to improve generalization, future studies should take into account a larger population. The present study has validated the effectiveness of Norms Activation Model, along with religiosity in explaining the intention of consumers to waste less food. Hence, future studies could examine these factors in other consumer behavior models and enhance the model by incorporating more psychographic/psychological factors to determine the intention to waste less food.

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