



**Exploring Social Identity and Responsible Consumption Behaviour
Paradox Among Muslim Households: Food Waste During Ramadan**

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by

Hassan Mohamed (MSc, PGDip, FHEA, ASPIRE fellow)

Student ID/ 201942578

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Publications and Conferences

Conferences

Hassan Mohamed Hussein Mohamed, Nilanthi Ratnayake, & Gunjan Saxena (2024). Food Waste Management: Exploring Multi-faceted Social Identity Shifts among Muslim Households during Ramadan. *AMA Summer Academic Conference*, competitive paper, p. 687 – 698.

Journals

Hassan Mohamed, Gunjan Saxena, Nilanthi Ratnayake & Ahmed Zaki, Extending the reach of SDT through consumers' 'religiosity' towards food waste reduction behaviour. Editing, to be submitted to *Psychology & Marketing* journal.

Abstract

Food waste has emerged as a critical global issue exacerbated by climate change and food insecurity. While research has extensively examined food waste behaviours in developed economies, limited attention has been given to Muslim communities, especially during the holy month of Ramadan. This study aims to bridge this gap by investigating the interplay between social identity and religious commitment in shaping food waste behaviours within Muslim households. The research is grounded in the frameworks of social identity theory (loneliness and materialism), social marketing (responsible consumption), and sustainability (food waste reduction and sharing economy).

A mixed-method research design was employed, comprising three studies to achieve the research objectives of understanding food waste general awareness, controlling the effect of COVID-19, contextualising food waste among Muslims during Ramadan, and testing the proposed hypotheses of the religiosity-social identity conflict. A priority-sequence approach was used, where qualitative preliminary studies (e.g., text analysis and exploratory survey) informed the data collection for a conclusive quantitative study (e.g., survey).

Following the social listening methodology, the analysis of 14,388 tweets revealed insights into general awareness of food waste and the impact of the COVID-19 outbreak in 2020. Content, sentiment, and semantic analyses indicated that users encouraged fighting food waste, especially during the pandemic. The loneliness due to COVID-19 measures led to food waste behaviour, with eating to pass the “time” and family/group consumption being prominent. These results helped develop hypotheses by studying the conflict between social identity-related factors and “group/family”-responsible consumption behaviour among Muslims during Ramadan.

Moreover, an exploratory survey of 299 Muslim families during Ramadan achieved the objective of understanding the context of Muslim families’ food waste behaviour during Ramadan. Muslims typically host 2-5 in-home banquets, which contribute to increased food waste during Ramadan, driven by the social identity-related need to accommodate unplanned guests and demonstrate generosity. Although Muslims understand Islamic teachings on food consumption,

they still exhibit food waste behaviour during Ramadan banquets. This gap between religious knowledge and practical application emphasizes the role of social identity. Consistent food waste generation was observed across the two daily meals throughout Ramadan, with key causes including banquet food, unplanned purchases, and exaggerated hunger. Ramadan banquets were highlighted as key venues for socializing with extended family, colleagues, and friends.

The third study surveyed 600 Muslim families during Ramadan to understand the conflict between social identity-related factors and responsible consumption driven by religiosity. The results confirmed that loneliness and materialism significantly contribute to food waste, outweighing the role of religiosity in reducing it. These findings were consistent across various demographic, socioeconomic, cultural, and country development variables. Hence, understanding the conflict between social identity and responsible consumption in a new research setting. This research advances theoretical understanding by focusing on the household as the unit of analysis, offering a holistic view of food waste behaviours within family dynamics. It explores the seasonal effects of Ramadan on daily routines in a unique Muslim community. It also introduces Ramadan banquets as a venue where social identity-related factors prevail over responsible consumption.

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Chapter 1 Introduction

“We are living on this planet as if we had another one to go to”

Terry Swearingen, Nurse & Winner of Goldman Environmental Prize in 1997

1.1 Introduction

This chapter introduces the PhD thesis by first outlining the current state of the food waste issue in the context of the Sustainable Development Goals (SDGs). It then reviews recent research initiatives and identifies related gaps. Following this, the research problem is articulated, and the research aim, and objectives are defined. The chapter also presents the research approach, along with the methods employed in the current study. Finally, an overview of the thesis structure is provided, as illustrated in figure 1–1.

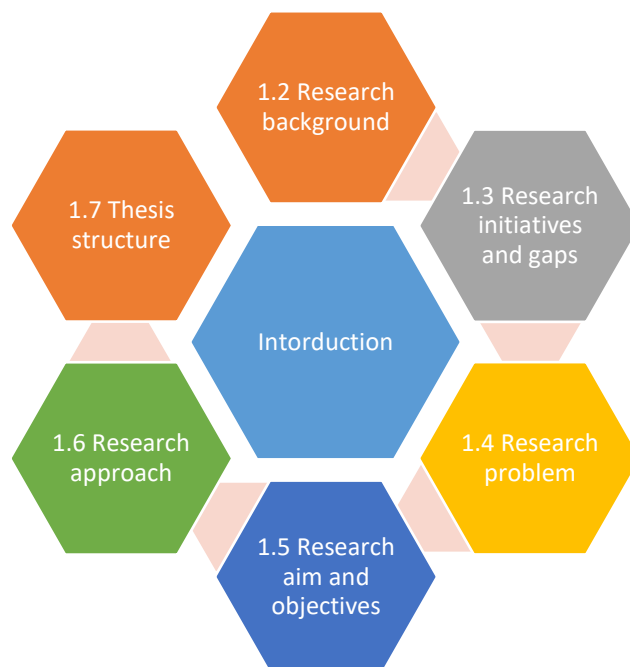


Figure 1–1, Introduction chapter map

1.2 Research background

It is of prime importance to note that the number of undernourished people has significantly increased from 607 million to 811 million in 2020. This means, on average, that 71-160 million people are likely to experience starvation. Also, one-third of reproductive-age women suffer from anaemia due to nutrition deficiencies. This results in more than 230 million children globally suffering from malnutrition. Notwithstanding, these clear statistics did not include the effect of the Corona Virus – 2019 (COVID-19) pandemic and its related consequences (António, 2023).

At the beginning of 2020, the World Health Organization (WHO) considered the COVID-19 outbreak a global pandemic. Since then, the world suffered from various post-pandemic consequences that were added to the existing issues (e.g., hunger, inequality, climate change, water scarcity, displacement due to wars). For instance, 119-124 million have been pushed back to extreme hunger due to the pandemic penalties (António, 2023). More specifically, the brink of starvation in specific African regions was doubled 10 times while the number of displaced citizens was raised by 400% in 2021 compared with 2019 (Snowdon, 2022). Therefore, the United Nations (UN) has refined the 17 Sustainable Development Goals (SDGs) of the 2030 agenda for developing a sustainable world to mitigate the newly fated disruption (Shulla et al., 2021). The first two goals have been allocated for the food security issue (i.e., SDG1: No poverty, and SDG2: zero hunger) (*Goal 1 | department of economic and social affairs. 2024; Goal 2 | department of economic and social affairs. 2024*).

As of mid-2024, despite the Ukraine-Russia war, the Palestine-Israel conflict, restricted shipping through the Suez and Panama canals, and soaring fuel costs, there is still plenty of food available to feed everyone. This indicates that the hunger crisis is not due to a lack of food. On the contrary, it is estimated that one-fifth of the food produced for markets is lost or wasted annually, costs US \$1 trillion (*5 facts about food waste and hunger. 2024*). For instance, while 2.4 billion people suffer from food insecurity, approximately 3.5 billion adults, adolescents, and children cannot afford a healthy diet, leading to obesity or overweight conditions (*Global issues - food. 2024*).

Moreover, food waste contributes to global green emission gas by up to 10%, almost 5 times the emissions of the aviation sector (*5 facts about food waste and hunger. 2024*). Therefore, two closely related Sustainable Development Goals (SDGs) are considered pertinent to the issue of food waste: SDG 12: Responsible Consumption and Production and SDG 13: Climate Action. For instance, the landfilling of food waste significantly increases fossil fuel emissions, particularly methane gas, which is projected to contribute to a global temperature rise of 1.5°C by 2035. This temperature increase, in turn, heightens the risk of submersion for many vulnerable cities due to rising sea levels caused by melting ice caps. Therefore, the negative effects of losing US \$ 1 trillion from the world economy, starvation, obesity, and gas emissions enlarge the crisis severity. Consequently, promoting sustainable consumption behaviours is essential to mitigate food waste and its associated environmental impacts (*Goal 12 | department of economic and social affairs. 2024; Goal 13 | department of economic and social affairs. 2024*).

Although governments and businesses are responsible for reducing food insecurity, 60% of the wasted food is at the household end (*5 facts about food waste and hunger. 2024*). Accordingly, urgent short-term actions have been advised by governments to maintain households' responsible consumption, such as waste reduction. Critically, existing literature suggests that by managing food waste behaviour, starvation of needy people can be reduced (Jain et al., 2018; Aka & Buyukdag, 2021). To this end, it is worth noting that countries with high-income levels are performing well in achieving the SDGs, including food, hunger, responsible consumption, and climate change goals. While other lower-income countries have limited resources to tackle the food waste issue, they suffer more than others from its subsequent food insecurity crisis, as in Figure 1–2.

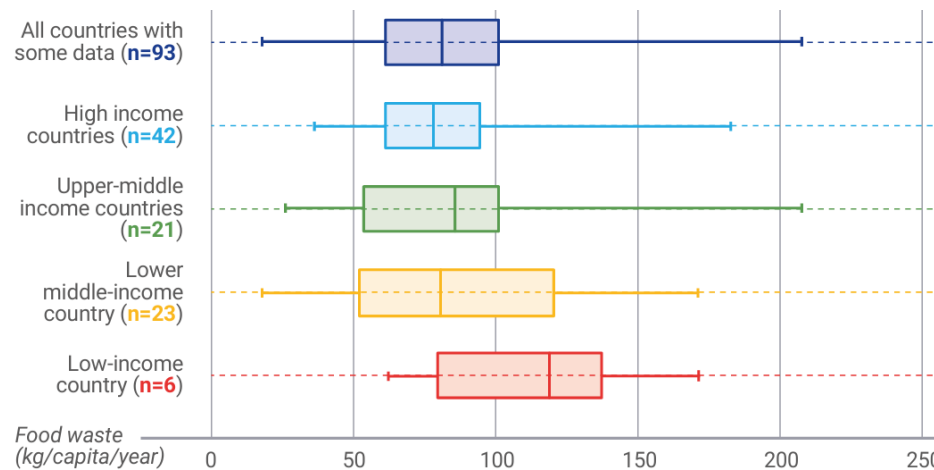


Figure 1–2, Box-plot distribution of household food waste estimates for countries (Food Waste Index Report, 2024, p. 38)

For instance, as in and Table 1-1, households in North African countries generate almost twice as much food waste as households in North America, Europe, Australia, New Zealand, and Eastern regions (Food Waste Index Report, 2024). Similarly, Sub-Saharan Africa, Latin America, Western Asia, and Southern Asia produce more food waste than developed economies. Although the academic literature is rich with studies on food waste management in well-developed countries, there is still a paucity of research in countries that are struggling to reduce their food waste (Thi et al., 2015). Hence, the focus of the current research. A shared attribute among the main contributors to food waste is Islam, the dominant religion with over 2 billion adherents, encompassing all of North Africa, most of Western Asia (except Israel), and major populated countries in Sub-Saharan Africa. Accordingly, the current research focuses on *Muslim communities*.

To this end, it can be seen that households in less developed and low-income countries produce food waste while they are starving from food insecurity. Governments and businesses do not have the resources to recycle or mitigate food waste, while there are other long-term projects that compete with each other on the same limited budget. However, they can benefit from the sharing economy applications.

Table 1-1, Average household waste (kilograms per capita per year) in each region (Food Waste Index Report, 2024, p. 45)

Region	Average household waste generation	Region	Average household waste generation
Northern Africa	140	Western Asia	116
Sub-Saharan Africa	93	Eastern Europe	53
Latin America and the Caribbean	95	Northern Europe	69
North America	76	Southern Europe	83
Central Asia	N/A	Western Europe	80
Eastern Asia	70	Australia and New Zealand	79
South-eastern Asia	70	Melanesia	92
Southern Asia	100	Micronesia	38

The prime objective of the *sharing economy* application is to reduce purchasing behaviour by sharing goods, services, ideas, techniques, processes, etc., between individuals and businesses. This approach, known as collaborative consumption (Benoit et al., 2017), aims to reduce the consumption of Earth's limited resources (Sadiq et al., 2023). Additionally, it helps alleviate the pressure on natural resources by facilitating a circular economy, reintroducing discarded products into the economy to generate value (Malik et al., 2022). Additionally, intensive research has been applied to individual consumption behaviour (Stancu et al., 2016), yet the literature lacks the application on *group/collaborative consumption behaviour*. Hence, the current research is applied to *Muslim families*.

Moreover, the food waste issue can be voluntarily mitigated by behavioural change initiatives of the households, such as social marketing applications (Kim et al., 2019). Next, the following section highlights the importance of current research applications of social marketing in reducing household food waste.

1.3 Research gaps and implications

Social marketing is a strategic approach that goes beyond raising awareness to actively changing behaviours. It leverages insights from psychology, sociology, and marketing to design interventions that are not only informative but also persuasive and sustainable (White et al., 2019). It is particularly effective in promoting responsible consumption and mitigating food waste by addressing the underlying social and behavioural factors contributing to these issues (Kim et al., 2019). By focusing on behaviour change, social marketing can address the root causes of food waste and promote more responsible consumption patterns to encourage pro-environmental behaviour (Carla Rodriguez-Sanchez, 2023; Kim et al., 2019). More specifically, The Community-Based Social Marketing (CBSM) framework helps communities design and develop programmes to foster citizens' environmental and responsible behaviour at community levels (Carla Rodriguez-Sanchez, 2023).

In this regard, when local governments suffer from limited resources to change their community behaviour, they depend on social marketing tools to encourage voluntary behavioural change towards sustainable and responsible consumption behaviour (Kim et al., 2019). Among the most recent food waste reduction are the adoption of social marketing tools, Food Waste Segmentation, Fridge Night / Use Up Day, and "Too Good to Go – mobile application" (Cassia & Magno, 2024; Waste Reduction - Tools of Change, 2024). For example, online platforms have been shown to significantly reduce food waste by implementing customized strategies to combat this unethical behaviour. For instance, a case study of a university canteen's online platform targeting university students in Wuhan demonstrated that strategies such as 'Clean Your Plate', 'Over-Purchasing Reminder', 'Cancelling Packaging Options', and 'Sharing Table Waste Option' helped prevent food waste, saving approximately \$73 million (Du et al., 2024). Accordingly, the current research is driven by social marketing applications to promote *responsible consumption* among Muslim households.

To this end, the religious commitment of Muslims is introduced as the main driver in fighting food waste (Elhoushy & Jang, 2020). Although the previous research has clearly identified the positive effect of religious commitment on food waste reduction in daily routine life, there was a need for applied research to test

such a relationship in specific seasons such as birthdays, weddings (Lebersorger & Schneider, 2011; Abiad & Meho, 2018), or 30-days of Ramadan (Abiad & Meho, 2018). Therefore, the current research focuses on the specific 30 days of Ramadan as a season of worshipping when religious commitment levels hit the top. More specifically, the current research attempts to understand the role of *religious commitment* on food waste behaviour among Muslim families during the holy month of Ramadan.

However, it is crucial to mention that Muslims, during the holy month of Ramadan, find room to invite others to commit the good deeds of tightening the social bonds with their relatives and honouring guests by conducting food banquets. Such *banquets* have evolved over the years to satisfy the social need to belong to the social group. Therefore, the social identity is well grounded in the theoretical background of the current research.

In this regard, Muslims, during their daily routine over 11 months of the year, have no time or money to host their extended family or friends. Therefore, they develop some symptoms of the feeling of loneliness. Such loneliness has increased due to COVID-19 measures in 2020 and 2021 when this research started. Such a feeling enlarges the fear of being negatively evaluated by others. Hence, the fear of losing membership in the social group during the season of remedy all psychological fears. Therefore, self-regulated means were reported to remedy the fears of losing the membership (Loh et al., 2021). Accordingly, a self-regulated means to fight for Muslim household membership exitance in the social group is by hosting banquets during Ramadan. Not only traditional food with regular quantity but high quantity of food to show generosity and to avoid the fears of unplanned guest(s) attendance (Wang L. et al., 2017).

However, true believers during the holy month of Ramadan understand the sin of wasting food, especially with repeated reminders during their fasting time from Mosques. To this end, the current research extends the literature review by studying the role of religiosity and social identity-related factors in reducing food waste among Muslim households during Ramadan. The current research aims to uncover the *conflict between religiosity and social identity*-related factors. Social marketing applies consumer behaviour theories, such as

the *Theory of Reasoned Action*, to support the attitude–behaviour direct positive relationship (Kim et al., 2019). Therefore, religiosity should lead to food waste reduction even if the Muslim household needs to support their social identity by preparing extra unneeded food to support their social identity. However, the *attitude-behaviour gap* (Sudbury-Riley & Kohlbacher, 2016) can justify the role of materialism driven by loneliness in an ethical situation, such as food waste, which can justify the suppression of the role of materialism over the feeling of religious commitment due to *self-discrepancy* between actual-ideal-ought selves (Higgins, 1987).

Moreover, studying the Muslim family dynamics has some limitations due to the COVID-19 measures in 2020 and 2021. Hence, the group dynamics of the unit of analysis were reported by one sampling unit, namely, the woman who is preparing food for her Muslim family during Ramadan. Moreover, this supports the *female* gender as the central pillar of homes (O'Neill & Buckley, 2019). Also, the Food and Agriculture Organization is interested in increasing female nutrition awareness, as they are responsible for raising children, especially in Muslim communities where they are committed to staying at home when necessary, and men should work and pay for all the house and marriage expenses.

Also, some of the direct relationships between religiosity and food waste, and social identity-related factors and food waste were confirmed on the individual consumer level across various demographic factors; there is no literature focused on the family level nor their related demographic factors. Moreover, since no global framework exists to mitigate food waste, a country resources-based long-term strategy should be developed and customized to reduce food waste. These resources include the customer, the business, natural resources, economic status, education and literacy levels, current practices, and regulations, as in Taiwan (Thi et al., 2015) or Malaysia cases (Kasavan et al., 2019). Therefore, the current novel research gap is tested across *demographic* and *sociodemographic* factors. These factors include individual and household levels such as woman's age, work pattern, education level, marital status, household size, household income, household socioeconomic status, living area, country culture, and country development level. To this end, the current research gap can be formulated.

1.4 Research problem

Food waste is a significant global issue exacerbated by various social, psychological, and contextual factors. In households, general food waste awareness remains limited, contributing to irresponsible consumption and disposal practices. The COVID-19 pandemic has further influenced these behaviours, altering food purchasing and consumption patterns that are not yet fully understood. Additionally, there is a lack of research on Muslim families' unique food waste behaviours during Ramadan, which is marked by increased food preparation and consumption. Simultaneously, Muslims may increase food waste while practising high levels of religiosity due to social group membership maintenance.

Therefore, this research seeks to fill these gaps by understanding *To what extent Muslim households during the holy month of Ramadan commit to their religious teachings to reduce food waste generated by Ramadan banquets while simultaneously dealing with the fear of losing their social group membership if they do not prepare extra food for their guests?*

These drivers have been identified as contemporary issues in society and have recently PhD scholarships by British universities for timely investigations: the University of Sussex for responsible consumption, the University of Sheffield for loneliness, and the University of Warwick for machine learning topics (*Machine learning at university of Warwick. 2024; Loneliness at work at university of Sheffield. 2024; Responsible consumption at university of Sussex. 2024*). However, to the researcher's knowledge, this research is the first that examines this paradox among Muslim households during a seasonal period.

1.5 Research aim and objectives

The current research aims to study the conflict between the drivers of food waste behaviour among Muslim families during the holy month of Ramadan. Consequently, four main objectives are formulated as follows:

Obj1: Explore the general awareness of food waste among households.

Obj2: Uncover the role of COVID-19 pandemic on the food waste issue among households.

Obj3: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month).

Obj4: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.

It is worth noting that this research began in early 2020, during the initial stages of the COVID-19 pandemic. The third objective, which aimed to understand the impact of COVID-19 on Ramadan food waste, was relevant at that time. While COVID-19 has since transitioned to an endemic phase, its influence during the data collection period remains a valuable aspect of the research to control.

1.6 Research approach

A mixed-method qualitative-quantitative research design is applied to achieve the research objectives. First, multi-method qualitative research is applied to explore food waste awareness among households, to uncover the effect of the COVID-19 pandemic on food waste behaviour, and to contextualize the food waste behaviour among Muslim families during Ramadan's season in 2020 and 2021. Second, conclusive research is applied to test the effect of social and psychological drivers on food waste behaviour.

In the qualitative phase, social listening is adopted to understand the food waste perception among X (previously Twitter) users worldwide. A total of 14388 valid and complete tweets were extracted from 42552 randomly selected tweets from 21-6-2020 to 3-8-2020. Content, Sentiment, and Semantic network analyses are applied to understand X users' perception of food waste.

In addition, 299 valid and complete semi-structured questionnaires are collected from Muslim women responsible for their families regarding cooking and housekeeping-related activities. Such a survey is applied to contextualize food waste behaviour among Muslim families during the blessed month of Ramadan in 2020.

Finally, as a result of the first two studies, the final conclusive survey is launched to collect data on the food waste of Muslim families at Ramadan banquets during the COVID-19 pandemic. Six hundred valid and complete questionnaires were collected from Muslim women responsible for cooking the food for their families and housekeeping activities in the blessed month of Ramadan 2021.

1.7 Thesis structure

The current thesis has been divided into seven chapters. Moving from the *first chapter* of the introduction, the *second chapter* clarifies the theoretical background of the study variables, namely, food waste behaviour, religious commitment, materialism, and loneliness. The *third chapter* discusses the direct and indirect relationships between the study variables to develop the conceptual model. The *fourth chapter* explains the research methods utilized to collect the required data. Then, the *fifth chapter* illustrates the detailed data analysis steps for the three studies to achieve the study objectives. Furthermore, *chapter six* is allocated to correlate the current research data analysis results with the previous literature. Finally, the conclusion in the *seventh chapter* includes the necessary implications and their related recommendations, limitations and future research.

1.8 Chapter summary

The current chapter provided an overview of the research background and its critical importance. It explored existing research initiatives concerning food waste behaviour, identifying gaps in the literature. The chapter then outlined the research aim, objectives, and methodological approach. Finally, it delineated the thesis structure, consisting of seven chapters. Next, the theoretical foundations of the study variables will be discussed.

Chapter 2 Theoretical Foundations of Food Waste Behaviour, Religious Commitment, Materialism, and Loneliness

“We think sometimes that poverty is only being hungry, naked and homeless. The poverty of being unwanted, unloved and uncared for is the greatest poverty. We must start in our own homes to remedy this kind of poverty.”

Mother Teresa

2.1 Introduction

This chapter begins with the food waste issue, including its importance and related management practices. Then, it distinguishes the commitment to religious teachings from spirituality and ethics. Moreover, consumer materialistic values are included with relevant theories and perspectives. Finally, the individual’s feeling of emotional and social loneliness and its dimensions are discussed to reflect the COVID-19 pandemic in the current research, as in figure 2–1.

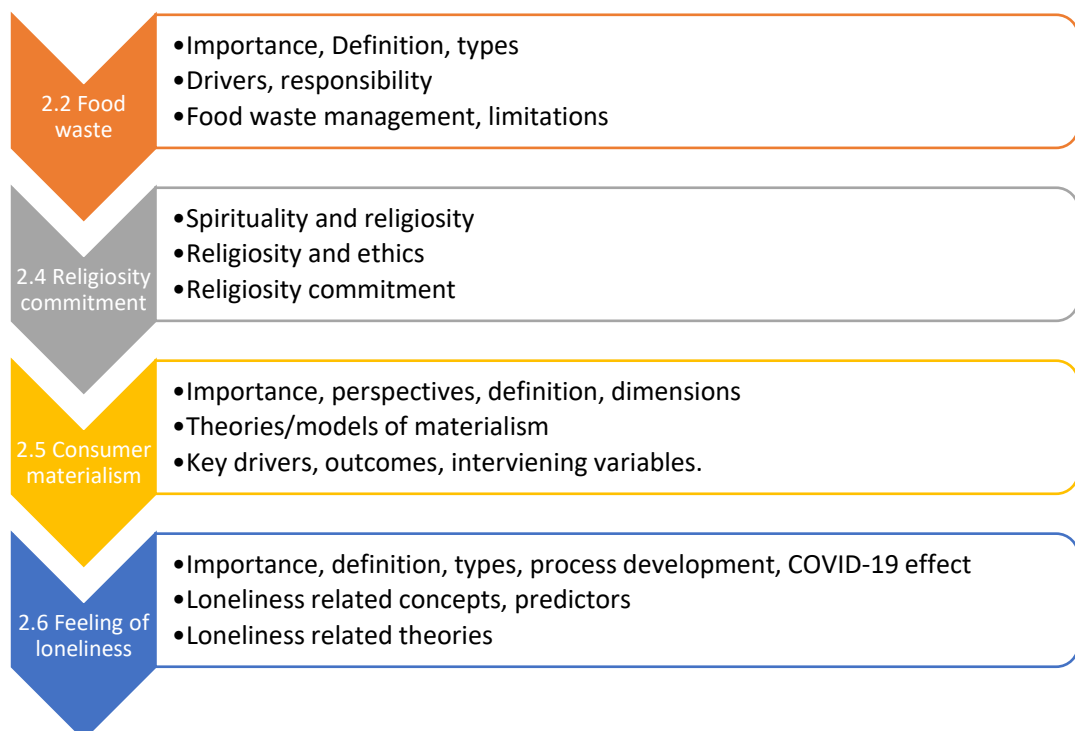


Figure 2–1, Theoretical background chapter map.

2.2 Food waste

2.2.1 Defining food waste

Literature recognizes two closely related concepts, i.e., food waste and food loss. On the one hand, food waste is “the decrease in quantity or quality of food ... intended for human consumption that are ultimately not eaten by people or that have incurred a reduction in quality reflected in their nutritional value, economic value or food safety.” (FAO, 2015). On the other hand, food loss refers to the by-accident food waste or the removed inedible parts of the food throughout the supply chain process that negatively affects the environment (Grandhi & Appaiah Singh, 2016). The main difference between the two concepts is the level of human involvement. Accordingly, unintended wasted food increases food loss, while food waste entails both intended and unintended behaviour. In both definitions, food waste refers to the human inability to eat the prepared food. Consequently, a broader definition of food waste includes controlled and uncontrolled wasting behaviour and is employed in the current research (Filimonau & De Coteau, 2019).

2.2.2 Types of food waste

Different perspectives on classifying food waste are mentioned in the literature, as in figure 2–2. Each determines the strategies to mitigate food waste in the supply chain tiers. While the pre-consumer stage includes agriculture, manufacturing, distributing, and retailing food waste, the post-consumer stage refers to the household wasted food (Filimonau & De Coteau, 2019). In addition, scholars proposed different indicators to categorize the food waste (Garcia-Garcia et al., 2017). Moreover, from the food preparation perspective, food waste can be generated from the pre-kitchen, kitchen, and post-kitchen preparation stages (Filimonau & De Coteau, 2019).

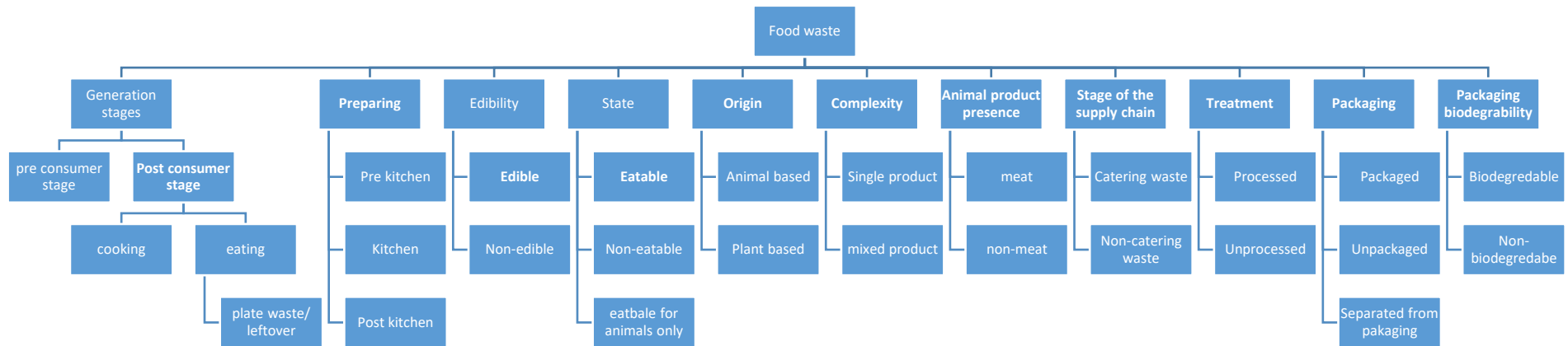


Figure 2–2, Food waste categories

2.2.3 Food waste drivers

Indeed, mitigating food waste aim cannot be achieved without targeting the leading causes of food waste (Stangherlin & Barcellos, 2018). As the highest proportion of food waste originated from households, the lack of consumer awareness of the food waste issue becomes the major driver of food waste. Therefore, all the reported drivers in the literature driven by the end-user, such as oversupply estimation, high-quality standards, cost/benefit analysis of the food disposal, food plenty, and consumer attributes (Jenny Gustavsson et al., 2011).

Regarding the oversupply estimation, the supply chain should cover the expected demand with marginal errors. These marginal errors can justify the food waste over the supply chain tiers. Even though various retailers in developed countries highly rely on sophisticated methods to predict the demand for each edible food item, this oversupply is estimated in everyday economic situations. Therefore, the estimation misleads supply chain management in unprecedented circumstances (e.g., the COVID-19 pandemic).

Moreover, consumers have increasingly demanded high-quality standards for food, such as cosmetic factors, including colour, smell, appearance, size, and packaging. These stringent expectations contribute to significant food waste at the retail level. In response, retailers have established their private standards, which further increase the rejection rate of food throughout the supply chain. As a result, the food quality assurance standards outlined in governmental regulations and policies are often disregarded, leading to higher levels of food waste than anticipated. This not only exacerbates food waste but also negatively impacts the efficiency and profitability of the supply chain (Devin et al., 2018).

In high-income countries, food waste is more than double that in developing economies. This disparity is primarily due to the cost-benefit analysis customers perform when deciding to dispose of food. In such developed countries, food is often inexpensive and heightened awareness of health, nutrition, and hygiene issues leads consumers to discard unhealthy, non-fresh, and leftover foods (Devin and Richards, 2018). Additionally, excessive buying behaviours (Kularatne et al., 2019) and limited knowledge of how to cook with leftovers, extend shelf life, or socially accept food sharing contribute further to the higher

volume of food waste (Elitzak & Okrent, 2018). Moreover, from the social lens, the lack of awareness, acceptance of food waste as a social norm, inadequate storage, less preparing food habits, refusing to take away plate leftovers at restaurants are the major drivers of food waste on the social level (Joshi & Visvanathan, 2019).

2.3 Food waste behaviour

This section highlights key studies emphasising the importance of studying food waste. It also focuses on the behaviour of households that waste food. It specifically shows the relationship between consumer behaviour (e.g., wasting behaviour) and its key drivers.

2.3.1 General waste

The major environmental sustainability issues stem from three primary sources, namely, Pollution, Global warming and climate change, and Land degradation and agriculture constraints (Arora et al., 2018). Due to the COVID-19 outbreak in 2020, pollution has become the primary concern of the globe. Accordingly, global pollution is boosted by waste, which calls for more research. Therefore, in exploring waste to minimise pollution and negative outcomes, the waste can be divided into various categories: hazardous, non-hazardous, solid, liquid, water, energy, and food.

Indeed, food waste dominates people's awareness more than other types of waste (Filimonau & De Coteau, 2019). This is due to the multi-faceted role of food waste that contributes to the general world's waste (Kim, Yeonsoo, 2017). In this vein, only food packing embodies 60% of the total packing waste (Marsh et al., 2007). Moreover, food waste also increases water and soil pollution, deforestation, and global warming caused by methane (Fox, 1997), as Kim (2017) reported. Thus, with increased environmental awareness, people should not waste their food. Instead, their behaviour towards such disrespectful food waste practices must be strongly negative (Närvänen et al., 2018). For instance, (Vranica, 2018) reported that about 40% of customers purchase a product from a societal or political issue brand for the first time, while almost 64% of the customers abandon a brand when it ignores these issues. Therefore, the previous

attempts to increase awareness about food waste behaviour can be extended from retailing to various contexts (i.e., hospitality and household).

2.3.2 Importance of minimising food waste

According to the Food and Agriculture Organization of the United Nations (FAO), nations should take action to achieve the 2030 sustainable development goals. The first three goals of the 17 sustainable development goals are to end poverty in all forms everywhere, to end hunger, achieve food security and improve food nutrition and promote sustainable agriculture, and to ensure healthy lives and promote well-being for all ages (FAO, 2015).

In 2015, more than 737 million people lived under \$2 a day. Hence, agriculture, food security, and an off-farm economy can create jobs and eliminate hunger, allowing those people to feed their dependents. However, with the increase in the population, agriculture needs to be increased by at least 50% to meet the growing population needs in 2050. However, with the green lands shrinking, people may suffer more. Therefore, food security, conservation consumption, and food waste management become the strategic imperatives to ensure healthy lives and the well-being of everyone (FAO, 2015). In doing so, the FAO prioritized mental health and nutrition awareness among females to stop poverty and hunger. In addition, the FAO promoted the “one health” strategic action plan that extends health from human to animal and farm levels (FAO, 2011). To this end, the current research attempts to understand the household’s food waste behaviour and its related antecedents in order to change it in the future.

In addition to the abovementioned normal circumstances, in 2020, the new COVID-19 virus broke out over the globe, leading the world business to stop everywhere on the planet. The total cash, jobs, and economic loss cannot be compared with peoples’ lives. Every country tried to save its population. Public health awareness is increased by spreading various campaigns and World Health Organization (WHO) recommendations. In this respect, people should stay away at least 2 meters from anybody, wash their hands for at least 20 seconds, wear masks, and most importantly, stay at home. Therefore, changing household food waste behaviour becomes necessary to save lives.

Hence, the food waste issue is essential to secure the required food as a national priority to avoid starvation. However, job insecurity and lockdowns have led people to panic buying behaviour. Accordingly, both necessary and unnecessary food shelves in supermarkets were empty. People stockpiled food to meet their prospective needs rather than giving the less-income people the chance to meet their needs. This pandemic increased food waste and caused more starvation and hunger with the same amount of food that is supposed to meet each body's needs. Moreover, the Health institutions in each country could not prove the virus transfer from the food to humans, i.e., "*It is very unlikely that you can catch coronavirus from food.*" (Gov.UK, 2021). Which increased to panic buying without fears of the virus.

Apart from the above, Chinese scientists thought that the COVID-19 has been originated from the live animal market in Wuhan because of the low levels of hygiene awareness (Maxmen, 2022). Accordingly, changing people's behaviour is the top priority, not repeating this COVID-19 disaster. Each country is responsible for altering its nation's behaviour through different strategies across different economic sectors. Regarding Health, Food, and Poverty, food waste management is the most crucial solution that prevents crisis replication. Therefore, studying food waste management is helping the world economy to recover.

The importance of food waste research originated from the consequences and volume of wasted food. First, food waste affects the three sustainability dimensions: Societal, Environmental, and Economic dimensions (Papargyropoulou et al., 2016) across developed and developing countries. From a social lens, food waste embodies moral, ethical, and health-related issues. In particular, the imbalanced food distribution leads to hunger and waste. Where hunger and starvation are almost located in developing countries, wasted food is recognized in developed ones. In this regard, scholars claim this issue by the food crisis as the food waste is estimated at 40% on one side; however, on the other side, almost one billion people suffer from food insecurity (Gunasekera, 2015). Moreover, the food waste issue negatively affects people's health by increasing their possibility of being obese among young adults and children, known as a health hazard (FAO, 2015).

In addition, the environmental discourse entails landfills, pollution levels, and climate change. In this regard, the food waste decomposition in landfills increases pollution levels and, in turn, affects climate change. In this regard, in landfills, organic materials, like food waste, are devastated by bacteria to produce methane. Methane is a greenhouse gas, which is more potent, warming 21 times more than CO₂. This directly increases global warming (Everyday changes to climate change, 2020). Food waste landfilling increases climate change by 8% (FAO, 2015) in addition to harming the environment through groundwater pollution, toxic gas emission and odours (Kasavan et al., 2019).

Furthermore, from the economic side, the useless landfills, water, and energy for composing the wasted food along with the wasted food itself cost the global economy about \$900 billion (FAO, 2015). For instance, once the landfills maximum capacity is reached, there is an issue to find a location for the new ones (Mohamed et al., 2017; Yukalang et al., 2018). Additionally, the employed efforts to produce the food (i.e., manufacturing, human power, energy, water, and raw materials) across the whole supply chain are wasted when the food is wasted as well (Thyberg & Tonjes, 2016).

Second, the importance of waste food research relies on its volume and cost. Although people suffer from starvation and hunger in developing countries, one-third of the produced food is wasted through the supply chain or at the consumer end. This costs almost \$1 trillion annually, shared between emerging countries, one-third, and emerging economies, two-thirds (Mishra & Singh, 2018). This represents about one-third of the produced food all over the world (Vranica, 2018). Thi et al., (2015) reported the daily food waste per capita as in table 2-1.

Table 2-1, Food waste per capita across countries, according to Thi et al., (2015)

Developed country	Food waste per capita (KG/day)	Developing country	Food waste per capita (KG/day)
Australia	0.25	Brazil	0.17
Denmark	0.32	Turkey	0.17
Sweden	0.27	Malaysia	0.18
Singapore	0.4	Mexico	0.16
USA	0.52	Costa Rica	0.19
Netherlands	0.31	Romania	0.18
Germany	0.34	South Africa	0.15
UK	0.37	Belarus	0.10
South Korea	0.27	China	0.14
Taiwan	0.23	Thailand	0.14
		Jamaica	0.16
		Ukraine	0.10
		Nigeria	0.14
		India	0.06
		Vietnam	0.06

Finally, food waste research from a marketing standpoint is crucial since it is initiated by the leading end customer-related sectors, namely, hospitality, restaurants, and retailing. Respectively, as the hotels were responsible for over 12 million tonnes of food waste in 2010 in Europe (Oliveira et al., 2016), food waste became the most prominent waste in the hospitality industry (Filimonau & De Coteau, 2019). To this end, Hotels can save about £250 million by reducing only 5% of their generated waste. Further, donating food instead of wasting it reduces the taxes of the hotels and increases its national legislation (Hotrec Hospitality Europe, 2017). Moreover, studies reported that hotels adopted environmental initiatives such as green practices (Kim, Woo Gon et al., 2017), renewable and clean energy use and pursued ISO 140001 certification (Hathroubi et al., 2014) is preferred by 90% of the guests. Moreover, in 2014, the National Restaurants Association (NRA) claimed that the restaurant sector is the second largest economic sector in the USA (Kim, Yeonsoo, 2017). Since food prices are generally low, people frequently ask for overestimated food to meet

their specific needs. Hence, the leftover costs of the plates make the restaurant sector one of the major contributors to food waste generation.

To this end, studying food waste in restaurants or hotel contexts is limited to customer evaluation based on the perceived performance of the service provider in decreasing food waste. However, in retailing and household food waste, the research aims to evaluate the retailer's role in mitigating the food waste across the whole supply chain. Accordingly, the food supply chain is more complicated than the traditional manufactured supply chain due to the freshness and organic nature of the food (Handayati et al., 2015). Hence, the retailers aim to adapt their supply chains according to customer needs, e.g., customer-centric, since the end users generate the maximum amount of food waste. In doing so, retailers employ marketing research methods to deeply understand customer needs and estimate futuristic orders (Singh et al., 2018).

2.3.3 Food waste responsibility and management challenges

On the one hand, since the determinants of food waste are mainly related to the customer, the responsibility for food waste is highly attached to the same customer. Accordingly, the role of the supply chain is limited to estimating customer demand and has recently been oriented by the “customer-centric” strategy suggested by Singh et al. (2018). Notwithstanding, as the customer is the victim of the introduced advertisements, all the time and via all means, by business that evokes compulsive buying behaviour, materialism attribute, and excessing purchasing, the customer becomes the victim, and the company is the offender. Therefore, retailers are encouraged to apply more transformational practices to reduce food waste via public communications (Sutinen & Närvänen, 2024). Moreover, although the most significant proportion of food waste is generated by end-user households, Devin and Richards (2018) acknowledged the shared responsibility of food waste between businesses, customers, and governments. This is due to the government's role of not only accessing and handling food waste but also mitigating it by regulating the customer-supplier relationship concerning food waste generation.

The barriers to food waste management include the fear of losing revenues, lack of consumer awareness, and poor management (Gollnhofer et al.,

2019; Kasavan et al., 2019; Jeawon et al., 2019). Regarding fearing losing revenues, Gollnhofer et al., (2019) explained the retailer's fear from the food-sharing practice to reduce the food waste. This case represents the conflict in managing food waste from the business sector. On the one hand, the business social responsibility imposes on food providers not only to reduce the sold items but also to increase the consumers' awareness of the food waste issue and help them prepare accurate demand estimation. On the other hand, from the financial side, the stockholders push the service provider to gain more profits by selling more unneeded items and "burying their heads in the sand" on the food waste issue. In fact, this reflects the supply chain power over the customer perspective.

Moreover, since the customer is the most effective producer of food waste, but the responsibility is shared with business and government, the lack of customer awareness and education about the food waste issue is the most critical obstacle to controlling it. Accordingly, the provider is responsible for creating customer awareness at the retail store or restaurant. However, a simple focus on developing customer awareness alone is not sufficient to reduce the waste (Jeawon et al., 2019). Hence, the lack of the provider green strategy, training programs, and social marketing interventions reduces customer awareness (Kasavan et al., 2019). Moreover, there is a need to enhance customer awareness by creating campaigns and movements designed for each country's community. For instance, most food waste in developing countries, at low and middle education levels, is generated after a meal. However, in developed countries with high education levels and high health and hygiene concerns, the food is wasted mainly before meal preparation (Thi et al., 2015).

In addition, the food providers resist food waste management, and the customer does it. Indeed, household food waste is the major contributor to food disposal. However, the customer can be divided according to the food waste awareness and involvement levels, as in figure 2-3.

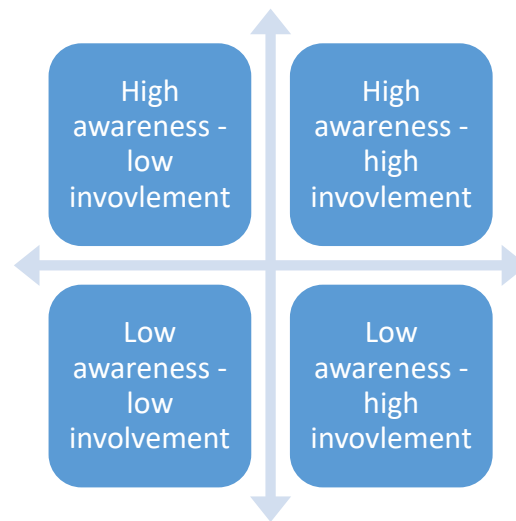


Figure 2–3, Food waste awareness-involvement categories

The high awareness and involvement levels reflect the intention to harm the environment. This is due to the high cost of reducing food waste. This customer is indeed aware of the food waste issue but cannot reduce it by food sharing, cooking the leftovers, or even making a schedule to separate the food waste (Kasavan et al., 2019). In addition, this customer may resist the change, insist on harming the environment, and prefer ignorance of the issue due to the high cost of reducing food waste. However, on the other extreme, the low awareness and involvement may be due to one family member not being responsible for food preparation and waste management in their house. Hence, (Jenny Gustavsson et al., 2011) prioritized female poverty and hunger as the major issues of the sustainable development action plans. In this accordance, family shopping, consumption, and food waste should be the futuristic unit of analysis in food waste research.

In addition, the low awareness and high involvement groups represent a significant proportion of the food wasters in developed and developing countries. In this regard, the low education level in developing countries, irrelevant education programs in developed countries, and deception in advertising lead to increased food waste in this market segment. Finally, the High-awareness and low-involvement groups are the most influential in food waste management as they can be accurate role models for other segments. In addition, they can benefit in the decision-making process by changing the different segments' customer behaviour.

Finally, the poor management of the issue is the last brick at the food waste “Sarcophagus”. Poor management consists of the four traditional management jobs: planning, implementation, coordination, and control. Whether intended or unintended, poor planning involves inaccurately estimating the demand-supply gap, budget, communication, facilities, and awareness programs. Accordingly, inaccurate bin sizes, collection routes, inadequate storing, ...etc will increase the food waste (Kasavan et al., 2019). In addition, the ineffective implementation risk caused by poor, inflexible plans increase the waste in the budget and facilities and the negative reactions towards the issue itself. As welling customers recognize the poor implementation as more waste in the budget and facilities that are indirectly funded by them in a high cost or high tax forms. In addition, the coordination between all responsible parties for food waste generation is weakening good planning and implementation. Therefore, unsustainable communication and management orientation of the issue will cause a sudden end to each spent effort. In addition, the ineffective communications prevent the good implementation of the food waste management. For instance, the lack of knowledge sharing between the store management, staff, and customers across the supply chain reduces the conviction level of sustainable consumption. This results in increasing food waste (Kasavan et al., 2019). Finally, lack of control and regulations, ineffective control, distorted regulations and incoherent policies across the three main stages of food waste (e.g., pre-kitchen, kitchen, and post-kitchen) decrease the effectiveness of food waste mitigation practices.

Therefore, with the failure of getting the shared responsibility recognition among the three involved parties, the behaviour change of the end-user becomes a must to maintain the current levels of food security at a minimum. Hence, the current research aims to understand food waste behaviour and its related drivers to change it.

2.3.4 Food waste management in developing economies

In fact, landfilling in developing countries costs 80% of the food waste management compared to only 10% of the developed countries, which produces a double volume than the developing countries. Moreover, it is worth noting that landfilling is not the recommended method for treating food waste as it increases

the level of greenhouse gas emissions and the level of disease vulnerability. However, most developing countries, such as those mentioned in table 2-1, still collect and drop the unsorted food waste by landfilling strategy (Thi et al., 2015).

The abovementioned barriers, especially in developing countries, hinder the countries from applying the most effective practices to reduce, reuse, and recycle, known as the advanced 3-Rs model (Joshi & Visvanathan, 2019), and its innovative practices of change management for implementing the circular economy (Malik et al., 2022), to the lowest environmentally conservative solution, i.e., landfilling. In most Asian countries such as India, Bangladesh, and Sri Lanka, the spending efforts and money assigned to food waste management do not yield promising results. Instead of food separating from the source, the food waste management strategy became focused on collection and landfilling. For instance, Vietnam planned to manage greenhouse gas emissions by diverting food waste from landfills. However, the Vietnamese case shows the poor implementation of its plan causes the country failure not only in applying this plan but also increases the unsorted food waste in landfills and animal feeding, which is no longer allowed in developed countries such as the EU and Australia (Joshi & Visvanathan, 2019).

On the other hand, Argentina allocated the Whole World Bank \$40 million in loans and grants to reduce food waste through partnerships with retailers and food banks by closing over 70 dumpsites and building 11 waste facilities from 2000 to 2019 (Solid Waste Management, 2019). In addition, one-third of the food in Jamaica is wasted in landfills. Interestingly, the CaribShare Biogas company is working in Jamaica to transform food waste from landfills into clean energy. In this regard, CaribShare Biogas collects organic food waste from farms and hotels in Jamaica and converts it into Biogas that can be transformed into affordable and reliable electricity. In 2012, the company produced 2k MWh of electric energy per year. A promising company has received support and funds from the government and different world institutions to survive and expand (Caribbean biogas company to provide energy from waste to housing development in Jamaica, 2014). Moreover, The Egyptian food bank launched an Anti-Food Waste awareness program to raise the great amount of food waste that can feed poor people in Egypt. An awareness-raising program generated a protocol between the Egyptian Food Bank and the Egyptian Hotel Association.

Accordingly, the food bank provides foil trays to pack the untouched food from the main buffet to be distributed to the nearest NGO or needy people. The success of this protocol led to holding campaigns encouraging people to do the same with their leftovers at home. These campaigns provide foil trays to the people to pack untouched food for their events or large meals to be redistributed (Anti-Food Waste, 2020).

2.3.5 Food waste management needs

Scholars mentioned various needs for managing the food waste issue, and these are the increased awareness of the issue among the people, commitment to the national and international sustainability goals and agreements, political status, natural resources, and technological and manufacturing advancement level (Diaz-Ruiz et al., 2018; Joshi and Visvanathan, 2019). In this vein, a country's natural resources in cold-temperature weather, such as green lands and rain, are different from those in high-temperature weather, such as deserts and sunlight. Each country, with its unique resources, needs to apply different methods to mitigate food waste e.g., island-based hotels in Malaysia (Kasavan et al., 2019). Therefore, this study focuses on understanding food waste behaviour and its determinants to change it and reduce the amount of food waste generated. Yet, the actual behavioural change needs specific actions that vary from one country to another.

2.3.6 Food waste management strategies

Although scholars and practitioners have tried to classify food waste management in frameworks, none of their proposed models can be generalized as a unified and standard best model for practice (Filimonau & De Coteau, 2019). Among the proposed practices; redesigning the kitchen process, consumer awareness-raising programs, food recovery and recycling, food redistribution, dumpster diving, food sharing, source separation, left-over reuse, correct food storing, First-in vs First-out, limited standard menus, composting technology, efficient forecasting, Shelf-life management, cold-chain management, proper training to employees, Best-before date, self-catering, saving money initiative, animal feeding, anaerobic digestion, landfilling, incineration, and food donation (Karim Ghani et al., 2013; Thi et al., 2015; Mishra & Singh, 2018; Närvänen et al.,

2018; Singh et al., 2018; Filimonau & De Coteau, 2019; Gollnhofer et al., 2019; Jeawon et al., 2019; Kim, Myung Ja et al., 2020)

Among the proposed practices to reduce food waste discussed in the literature, increasing consumer awareness emerges as a critical factor. By enhancing consumers' understanding of food waste issues and effective waste-reducing behaviours, food waste could be significantly decreased. In doing so, the governments and communities on a large scale applied various initiatives to raise consumer awareness about the food waste issue (Devin et al., 2018; Jeawon et al., 2019). The FAO first introduced Save Food in 2011; a toolkit that suggests techniques to quantify and classify food waste was developed by the European Commission in 2015. Love Food Hate Waste (LFHW) initiative is designed mainly to educate consumers about the negative implications of the food waste across different economic sectors in the UK in 2015 (Filimonau & De Coteau, 2019), Green Sri Lankan Hotels (Kularatne et al., 2019), Food Waste into Energy in the US, and Zero Waste in the Europe and Taiwan (Thi et al., 2015). It is worth noting that most of these successful implementation initiatives are in developed countries since they have the technological advancements, well-educated people, and proactive long-term orientation to treat the sustainability issue (Thi et al., 2015).

To this end, since large-scale strategies cannot be easily applied in developing countries, businesses attempt some small-scale strategies to reduce food waste that are sometimes supported by consumer movements such as Anti-waste movement, food-sharing, Dumpster diving, and food donation (Filimonau & De Coteau, 2019; Gollnhofer et al., 2019). However, it seems that changing consumer behaviour to improve awareness about sustainability, conservation, and food waste issues is not easy and is boosted by some factors. These factors can be internal motives such as beliefs, values, attitudes, and emotions or external drivers such as social norms, culture, and regulations. Hence, changing consumer behaviour should carefully consider both drivers (Grilli & Curtis, 2019). Accordingly, some incentives have been reported as effective methods to encourage customers to reduce food waste, such as monetary rewards or gift vouchers (Jeawon et al., 2019).

However, the fragmented strategies urge structuring and customizing them to attain the maximum advantages. Consequently, few attempts have been reported to classify food waste management strategies (Betz et al., 2015; Thi et al., 2015; Eriksson et al., 2017; Garcia-Garcia et al., 2017; Filimonau & De Coteau, 2019; Joshi & Visvanathan, 2019). However, all of these attempts are impractical and cannot be generalized for all economies (i.e., emerged or emerging), for all cultures (i.e., individualistic, or collectivistic), for all sectors (i.e., restaurants, hotels, retailers, or households), for all household consumption pattern (i.e., single, or family member), for all food products (i.e., vegetables, milk, meat, or fish), and even all vegetable food (i.e., organic, or non-organic).

Accordingly, applying one strategy from different managerial perspectives requires various methods to mitigate food waste. Increasing customer awareness from the marketing perspective requires marketing campaigns, from the production lens, which requires lean practices, and from the top-management level, which requires sustainable and environmental orientation. In addition, a problem-solving approach forces the management to apply multi-methods from various strategies (Kim et al., 2019). As well as applying these methods across the consumer changing behaviour levels. For instance, changing consumer behaviour needs to be applied sequentially on two levels; the first one is initiating the pro-environmental behaviour and then sustaining their behaviour (Grilli & Curtis, 2019). Therefore, it is important to mention that the primary objective of this study is to gain a deeper understanding of household food waste behaviour and its drivers to propose guidelines for its transformation. In doing so, a niche context of household food waste behaviour in a specific event - the increase in Muslim religious commitment and worship during the holy month of Ramadan - is adopted to provide precise practical guidelines.

2.4 Religious commitment

Among the psychological and social factors that may derive the food waste behaviour on households' level of analysis is religiosity (Elmenofi et al., 2015; Abdelradi, 2018; Abiad & Meho, 2018; Aktas et al., 2018; El Bilali & Ben Hassen, 2020). Therefore, this section aims to position religiosity in the food waste context based on the key studies presented in table 2-2. First, it begins by clarifying the relationship between religion and spirituality. Then, the relationship between

religion and ethics is discussed. After that, introducing the religiosity concept and its development by discriminating it from the religion itself. Nonetheless, the definition of religiosity and its dimensions are presented. Finally, the limitations of studying religiosity in the marketing literature review and its future research avenues are incorporated.

Table 2-2, Summary of religiosity-related literature review

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
(Cabano & Minton, 2023)	-Investigate the impact of religiosity on consumers' reactions to rational compared to emotional advertising appeals.	-Rationalization theory -IV (emotional/rational appeals/ad appeal) -DV (purchase intentions, brand trust, attitude toward the product) -ZV (religiosity) -MV (perceived fit)	-4 experiments	-Consumers with lower levels of religiosity show a preference for rational over emotional appeals, as these align better with their logical information processing style. Conversely, for individuals with higher religiosity, there is no significant difference in their response to rational versus emotional appeals.
	-Similarity/benefits to the current research: understanding the effect of religious commitment variation instead of studying the affiliation to a specific religion on consumer responses. Additionally, the multi-study research was applied in the current research as well.			
	-Differences from the current research: although the main outcome is based on consumer behaviour theory, brand trust was incorporated. Also, the whole research is based on the rationalization theory instead of the current research's social identity theory. Additionally, experimental study is not applied in the current research.			
(Minton, 2023)	-Identify the usage of various religiosity scales in academic marketing literature and assess the comparative effectiveness of these scales in predicting marketing and consumer behaviour outcomes.	-Religion and marketing domain -IV (religiosity scales) -DV (brand failure response, advertising response, consumer ethics, consumer control beliefs, consumer well-being, sustainable consumption, and charitable behaviour).	-Review of top 20 marketing journals and compare the used scales. -1941 adults were hired to review the scales	-The study revealed that two-thirds of religiosity scales in academic marketing articles are sourced from existing literature, with 20% being multi-item. Marketers should leverage these established scales and prioritize multi-item scales for a more comprehensive measurement of religiosity in predicting consumer behaviour outcomes.
	-Similarity/benefits to the current research: one of the seminal articles in understanding the role of religiosity in predicting sustainable consumer behaviour in the current research. It also helps in the conceptualisation and measurement of religiosity.			
	-Differences from the current research: the study is mainly a literature review rather than empirical or applied research as the current. Also, the study focuses on consumer religiosity, while the current research focuses on the conflict between social identity and religiosity in applied research.			
	-To what extent does religiosity influence consumers' efforts to	-Theory of planned behaviour -IV (religiosity)	-Survey on 583 Muslim customers from Egypt	-Religiosity plays a significant role in encouraging the reduction of food waste. It

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
(Elhoushy & Jang, 2020)	reduce food waste, and through what mechanisms does this influence occur?	-MV (personal norms/ activism/ attitude/ subjective norms) -DV (food waste reduction intentions) -ZV (perceived behavioural control)		is positively associated with consumer attitudes, activism, and personal and subjective norms related to food waste reduction. Notably, consumers' activism and personal norms act as crucial mediating mechanisms that translate the influence of religiosity into intentions to reduce food waste. However, attitudes and subjective norms do not appear to impact these intentions significantly.
	-Similarity/benefits to the current research: this research guided the current research in the direct relationship between religiosity and food waste reduction intention. Instead of studying the actual food waste, the intention was suggested from the theory of planned behaviour as in the current research. Also, the research recommended studying the seasonal food waste rather, the daily food waste.			
	-Differences from the current research: the research investigated some variables from the theory of planned behaviour, while the current research investigated variables related to the social identity theory. Also, the research was applied in Egypt, while the current one has more than one country. In addition, the research studied ordinary food waste behaviour, while the current research focuses on seasonal food waste.			
(Agarwala et al., 2019)	-Summary of the review on religiosity and consumer behaviour	-Social identity theory -IV [prayer (religious rituals), religious exclusivism and divine retribution (religious beliefs), frugality (religious values) and religious community involvement and religious identity (religious community)] -MV (well-being/ interdependence) -DV (low materialism/ intolerance/ consumer ethics/ risk aversion/ attitude toward religious products/ economic shopping behaviour)	-Literature review of top 20 marketing journals from 1990 to 1960	-Religiosity has a significant impact on various consumer outcomes, including materialism, intolerance, ethics, and risk aversion. It also shapes consumer attitudes towards religious products and influences economic shopping behaviour. These effects demonstrate how religious beliefs can guide and alter consumer preferences and actions in both ethical and economic contexts.

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
	<p>-Similarity/benefits to the current research: guiding the research by social identity theory-related factors, religious commitment, and materialism relationships. Religious commitment can alter consumer preferences and actions.</p> <p>-Differences from the current research: theoretical articles without practical application, while the current research is empirical. Also, the research did not investigate the conflict between social identity and religiosity.</p>			
(Jiang et al., 2019)	-Extend the theory of reasoned action and the theory of planned behaviour to evaluate how ethical and moral antecedents (such as integrity, moral judgement, extrinsic religiosity, intrinsic religiosity, and ethical concern) affect attitudes towards counterfeit luxury products.	-TRA/RBP -IV (integrity, moral judgement, intrinsic religiosity, extrinsic religiosity, ethical concern) -MV (attitudes) -DV (purchase intentions)	-Surveying 412 participants in China	-All antecedents negatively affect attitudes towards counterfeit luxury products. In turn, these attitudes positively influence purchase intention.
	<p>-Similarity/benefits to the current research: the use of the theory of reasoned action in studying the religiosity effect on committing unethical behaviour (e.g., buying counterfeit luxury products). Survey methods like the current research with structured surveys and well-established and validated measurements.</p> <p>-Differences from the current research: the unethical situation is buying luxury products, while the unethical situation in the current research is food waste behaviour. Two dimensions of religiosity were reported, while the current research supports the uni-dimensionality measurement level. Also, China is considered a developed economy with a Muslim minority, while the current research focuses on the developed and developing economies where Muslims are observed.</p>			
(Raggiotto et al., 2018)	-Investigates how environmental predisposition affects purchasing intentions.	-IV (intrinsic and extrinsic religiosity) -MV (materialism) - DV (ecologically conscious consumption behaviour ECCB, vegan purchasing intentions)	-This work is hence set within vegan consumption. Veganism has been mostly related to specific religious beliefs (like Buddhism), according to which it represents a core component of larger worldviews. -Surveying a sample of 842 Italian consumers.	-Religiosity influences consumer environmental predisposition, which, in turn, affects intentions to purchase vegan products. Intrinsic religiosity has a negative impact on materialism, while both intrinsic and extrinsic religiosity, along with materialism, are significant predictors of environmentally conscious consumer behaviour (ECCB), which in turn predicts vegan purchasing intentions. Extrinsic religiosity positively influences materialism, and materialism mediates this relationship. Additionally, materialism negatively affects ECCB. Multigroup analysis reveals that the

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
				impact of religious influences on consumer environmental predispositions can vary across different faiths.
	-Similarity/benefits to the current research: studying the direct and indirect relationships between religiosity and sustainability-related consumption behaviour via materialism. The survey method is applied in the current research as well.			
	-Differences from the current research: while the research focuses on more generic issues (environmentally conscious consumer behaviour), the current research is narrower by focusing on food waste behaviour. Two dimensions of religiosity were reported, while the current research supports the uni-dimensionality measurement level. Also, Italy is considered a developed economy with a Muslim minority, while the current research focuses on the developed and developing economies where Muslims are observed.			
(Souiden et al., 2018)	-Examines how individuals' ethics (including idealism and relativism), religiosity (such as fear of divine punishment, interest in religious practices, and religious beliefs), and attitudes towards counterfeits (such as economic and hedonic benefits) influence purchase intentions for counterfeit products.	-Dissonance theory -IV [individuals' ethics (i.e., idealism and relativism), religiosity (i.e., fear of divine punishment, interest in religion and practices, and beliefs in religion), and attitudes toward counterfeits (i.e., economic benefits and hedonic benefits)] -DV (purchase intentions of counterfeit products)	-Surveying 217 Muslims in Tunisia	-Regarding idealism, there was no significant difference between the two groups in their purchase intentions for counterfeit products; however, relativism showed a significant positive difference. In terms of religiosity, fear of divine punishment, religious belief, and religious involvement had significant negative effects. Lastly, economic and hedonic values had a positive and significant impact on purchase intentions.
	-Similarity/benefits to the current research: studying the direct effect between religion's related variables and unethical consumer behaviour (buying counterfeit products). Surveying the Muslim community (Tunisia, like Egypt in the current research).			
	-Differences from the current research: dissonance theory is used, while the current research is based on social identity theory. The unethical situation is buying counterfeit products, while the unethical situation in the current research is food waste behaviour.			
(Arli & Pekerti, 2017)	-Examine differences in moral ideologies and ethical beliefs between religious and non-religious consumers in Indonesia and Australia. Investigate the impact of moral ideologies and religiosity on consumer ethical beliefs.	-Ethics position theory. -IV (religiosity/idealism/relativism/intrinsic/extrinsic social/extrinsic personal) -DV (actively benefiting/passively benefiting/questionable practice/ no	-Surveying 451 and 669 undergraduate students in Indonesia and Australia, respectively.	-Religious consumers tend to favour idealism over relativism and exhibit stronger ethical beliefs concerning negative consumer behaviours compared to non-religious consumers. However, when it comes to specific ethical beliefs related to recycling, software piracy, and buying counterfeit products, cultural

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
		harm/ downloading/ recycling/ doing good) -ZV (country)		differences between the two countries overshadow the effects of religion.
	<p>-Similarity/benefits to the current research: studying the direct effect of religiosity on ethical consumer behaviour such as recycling. Studying the moderation role of the country guided the current research to incorporate country development level and culture as a possible control variable. Also, it uses the survey of undergraduate students in Muslim and non-Muslim-dominated communities like the current research.</p> <p>-Differences from the current research: the unethical situation is buying counterfeit products, and recycling, while the unethical situation in the current research is food waste behaviour. Also, the research focused on religious consumers vs non-religious ones, while the current research focuses on various levels of religious consumers. Finally, this article focuses on ethics position theory, while the current research focuses on the social identity theory.</p>			
(Mathras et al., 2016)	-Offers a conceptual framework for examining the impact of religion on consumer behaviour.	-Consumer culture theory (CCT)	-Every article in the journal of Consumer Psychology, journal of Consumer Research, journal of Marketing Research, journal of Marketing, and Marketing Science that mentioned "religion" in its text from 1992 to 2014	-Conceptualises religion as a multidimensional construct and proposes that it influences consumer psychology and behaviour through four dimensions: beliefs, rituals, values, and community.
	-Similarity/benefits to the current research: this research guided the current research in understanding the found dimensions of the consumer religion.			
	-Differences from the current research: this research focuses on the consumer culture theory, while the current research focuses on the social identity theory. This research is theoretical, while the current search is practical and based on primary data collection from field studies.			
(Minton et al., 2016)	-Addresses criticisms of prior research by (1) reducing cultural bias through studies conducted within a single country, (2) examining both religious affiliation and religiosity, (3) exploring a range of consumption behaviours (including social status desire, materialism, sustainable	-Values-based theories (e.g., values-attitudes-behaviour hierarchy, value-belief-norm theory) and social-based theories (e.g., social identity theory, social cognitive theory).	-1476 face-to-face interviews with residents (minimum age is 15) in Singapore. -Buddhist (36.4 per cent), Taoist (6.5 per cent), Christians (18.8 per cent), Muslim (13.6	-Consumers with high external religiosity are more materialistic, more sustainable, and more likely to volunteer compared to those with low external religiosity. Consumers with high internal religiosity are also more likely to adopt sustainable practices and hold pro-environmental views. Buddhists and Hindus are less likely

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
	practices, environmental views, and volunteering), and (4) testing the effect of religion on consumption behaviour.	-IV (religious affiliation/ internal religiosity/ external religiosity/culture) -DV (materialism/ seeking of status/ sustainable attitude/ volunteering behaviour/	per cent), and Hindus (6.9 per cent). -Nonreligious consumers represented 16.2 percent. -49.0 per cent of respondents were male.	to hold pro-environmental views compared to Christians. Additionally, Buddhists are more materialistic than Christians, while Hindus have a lower desire for social status compared to Christians.
	-Similarity/benefits to the current research: differentiating between religion and religiosity helps the research to position the research aim at religiosity levels rather than religious affiliation. Data collection from various religious affiliations guides the research to collect data from countries at various development levels. Religiosity, materialism, sustainable attitude, and volunteering behaviour relationships are confirmed across variables religions, including Islam, which is the focus of the current research.			
	-Differences from the current research: value-based theory and value attitude theory were used, while the current one focuses on social identity theory.			
(Minton et al., 2015)	-Investigate the relationship between religion and sustainable behaviours.	-Values research, self-determination theory, and inoculation theory -IV (religious affiliation/religiosity) -DV (sustainable behaviour)	-Surveying 388 respondents from us and South Korea -Across both countries, respondents consisted of 44.7% Christian, 16.5% Buddhist, and 38.8% atheist. Respondents had an average age of 33; 56% were female, 42% had received a college degree, 72% were currently or have been married, and 49% were at least moderately religious.	-More religious consumers are more likely to engage in sustainable behaviours, such as purchasing green cleaning supplies, recycling, and buying organic foods. Christians, atheists, and highly religious Buddhists show similar tendencies towards sustainable behaviours, with only minor variations across different locations.
	-Similarity/benefits to the current research: a direct relationship between religiosity and sustainable behaviour is used to support the current research hypothesis. Surveying participants with various demographic categories, similar to the current research.			

Article details	Aim and objectives	Theory and variables*	-Methodology	Results
Citation				
	-Differences from the current research: sustainable behaviour does not include food waste management as in the current research. Also, the research does not focus on Islamic teaching as the current research. Also, self-determination theory and inoculation theory are used to establish the theoretical background, while the current research is adopting social identity theory.			
(Al-Hyari Khalil et al., 2012)	-Develop a conceptual model that explores the relationship between religious beliefs and consumers' tendencies to boycott products.	-IV (loyalty) -MV (country of origin perception/ animosity/ conspicuous consumption) -DV (boycotting) -ZV (religiosity)	-Case study of boycotting of international Danish brands in Saudi Arabia	-There is a strong relationship and clear link between religiosity in Arabic/Islamic collectivist cultures and consumer behaviour, particularly in relation to boycotting.
	-Similarity/benefits to the current research: studying the religious commitment as a moderator between loyalty and boycotting. It applied the research on two countries with Muslim and non-Muslim dominance.			
	-Differences from the current research: studying the religious commitment as a moderator between loyalty and boycotting.			
(Essoo & Dibb, 2004)	-Examines how religion influences consumer choice, based on the proposition that adherence to a particular religious faith significantly affects shopping behaviour.	-Value system and social identity theories. -IV (religious affiliation/ religiosity) -DV (shopper profile)	-Surveying 600 heads of households on Mauritius island, which covers Hindu, Muslim, catholic or others.	-Religious affiliation should be incorporated into future cross-cultural research, as there is significant potential to explore its impact on consumer behaviour further.
	-Similarity/benefits to the current research: the role of religiosity on shopper profile helps the current research in understanding the various ways that religiosity governs the daily life of Muslims. This includes Ramadan banquets. Also, social identity was used to build the relationship.			
	-Differences from the current research: religious affiliation was incorporated; however, the current research focuses on the Muslim community.			

* IV (Independent variable), DV (Dependent variable), ZV (Moderator variable), and MV (Mediator variable)

2.4.1 Religion and spirituality

Confusion between religiosity and spirituality caused scholars to interchangeably use the two concepts (Fukuyama et al., 2014). This happens when the perception of either religion or spirituality is considered the main logic behind the principles that govern intended and unintended behaviours (Astrachan et al., 2020). Hence, there are some similarities and differences that cause the overlapping between the two constructs (Hill et al., 2000). Figure 2–4 indicates this overlapping.

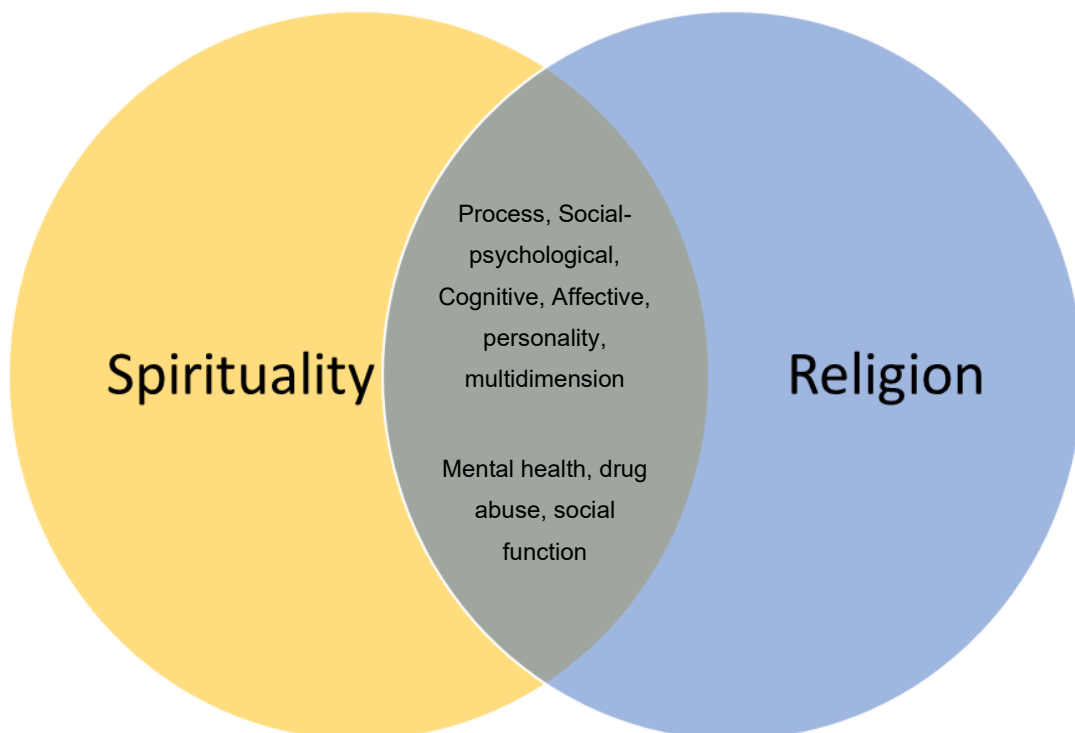


Figure 2–4, Religion-spirituality overlapping

Among the similarities between spirituality and religion in basic psychological research is the *lifetime span* (i.e., they are processes that evolve with human life from childhood until death). Also, the *social-psychological* phenomena (e.g., they need groups to be expressed and reference groups to be influenced, which in turn leads to the cultural norms) overlap spirituality and religion. In addition, spirituality and religion are *cognitive-related* phenomena (e.g., thinking complexity levels depend on the religious or spiritual commitment). Moreover, *affect and emotion* -related phenomena (i.e., they provide intense arousal in rituals such as glossolalia) that exist in both constructs. Moreover, both *multidimensional* constructs are related to the *personality and its genetic determinants* (i.e., some of their behaviours are heritable) and *mental health*

issues (e.g., psychopathology treatment approaches, they help aged, provide meaning to death, hope at the end of the life cycle, govern the diet, sexual behaviour, and healthcare consciousness), which *deny drug and alcohol abuse*, to have a *positive derivative social function* in the *application of the psychological knowledge* (Hill et al., 2000).

Indeed, this confusion is derived from defining religion as it is the relationship between humans and a greater human power, such as a superpower owned by a god. In the same vein, spirituality is connected to the god, world, or people (Hill et al., 2000). Hence, mostly, the god-oriented spirituality, the union with God, causes the overlapping with the religion. To this end, the spiritual believers may or may not be religious ones. But religious human persons consider themselves as spirituals (Souiden et al., 2018). Moreover, another possible reason for this overlapping stems from the ignorance of studying religion because most psychologists are not enough religious (Hill et al., 2000).

In addition, studying perspectives of the concepts from understanding the phenomenon rather than operationalising rigour definitions and testing the hypotheses or assumptions disrupt the differentiation process (Balog et al., 2014). Yet, this overlap can be diminished by distinguishing the religion from the spirituality. In this regard, religion is more linked to the worship house membership, attendance, and commitment, while spirituality is more related to personal experiences, transcendence, meaningfulness, and supra-conscious sensitivity (Hill et al., 2000). Scholars focus on each one independently is encourage (Hill et al., 2000; Astrachan et al., 2020). To this end, since religious people behave more ethically than non-religious ones (Souiden et al., 2018), the current study focuses on the religious rather than the spiritual effect.

2.4.2 Religion and ethics

Another related concept to the religion is the ethics. In this regard, Taylor (1975) defined ethics as “inquiry into the nature and grounds of morality where the term morality is taken to mean moral judgements, standards, and rules of conduct.” (Souiden et al., 2018). More specifically, consumer ethics can be defined as “the moral principles and standards that guide the behaviour of individuals or groups as they obtain, use, and dispose of goods and services” (Muncy & Vitell, 1992).

Obviously, the religion seems different from the ethics. However, the relationship between religion and ethics is ambiguous. On one hand, the research supports the positive relationship between the religiousness dimensions and the ethical beliefs. More specifically, the fear of divine punishment, religious belief, and religious involvement negatively affect the intention to buy counterfeit products (Souiden et al., 2018). In addition, a robust confirmation has been reported when an individual faces an unclear situation regarding ethics, the religious ones are likely to have stronger ethical beliefs than non-religious (Arlı & Pekerti, 2017).

On the other side, some scholars prove the non-significant religious effect on ethical behaviour dimensions, i.e., Passive, Deceptive, and No harm (Huang & Lu, 2017). Yet, this non-significant effect is limited to the Chinese consumers, where the study has been applied. In addition, some limitations stem from the surrounding environment, where the unethical purchasing of luxury counterfeit products may not be recognised in certain religious contexts (Riquelme Hernan et al., 2012).

Accordingly, ethical position theory (Forsyth et al., 2008) categorises nations based on moral approaches into four positions: Exceptionism, Absolutism, Subjectivism, and Situationism, as shown in table 2-3. This theory is anchored in two key moral dimensions: relativism and idealism. Relativism refers to the belief that moral rules are context-dependent, rejecting the notion of universal moral principles. In contrast, idealism is characterised by a strict adherence to moral absolutes, with the belief that right actions always lead to desirable outcomes. The combination of these two dimensions forms the basis for the four distinct ethical positions (Forsyth, 1980).

Table 2-3, Ethical position theory (Forsyth et al., 2008)

Idealism	Relativism	
	Low	High
Low	Exceptionism: Individuals should act in ways that are consistent with moral rules, but one should remain pragmatically open to exceptions to these rules. <i>Nations:</i> Belgium, Austria, Israel, New Zealand, the U.S. (east and mixed), Australia, Canada, and Russia.	Subjectivism: Individuals' personal values and perspectives should guide their moral choices rather than universal ethical principles or desire to achieve positive consequences. <i>Nations:</i> U.S. (West), Hong Kong, Japan, Thailand, and China
High	Absolutism: Individuals should act in ways that are consistent with moral rules, for doing so will, in most cases, yield the best consequences for all concerned. <i>Nations:</i> South Africa, Egypt, Poland, Saudi Arabia, Korea	Situationism: Individuals should act to secure the best possible consequences for all concerned even if doing so will violate traditional rules about ethics. <i>Nations:</i> Spain, Brunei, Turkey, Britain, India, Malaysia, Lebanon, and the UAE

Accordingly, the religion has high standards that induce the moral principles. For instance, Islam teaching was found to support the highly idealistic rules (Souiden et al., 2018). Hence, researchers suggest religion-based research studies to be narrow as much as it should be since individuals have differences in their behaviours at the same culture, environment, religion, and group (Hill et al., 2000) and ethical position, even in the same household. Accordingly, this research examines the impact of religiosity on specific waste management practices among Muslim households during the holy month of Ramadan while also considering how different demographic factors (i.e., socioeconomic status, culture...etc) among households may affect these practices.

2.4.3 Religiosity

2.4.3.1 Religion and religiosity

To proceed with positioning the current research variables, there is a difference between religion and religiosity that has been barely clarified. With respect to this dilemma, some authors tried to discriminate between them, but eventually, at a certain point, they used them interchangeably. More precisely, in measuring an individual's religiosity, Souiden and Marzouki (2015) reported many times religion instead of religious and one time (p. 146), as they reported them as synonyms.

Following that, religion can be defined as “the belief in and worship of a god or gods, or any such system of belief and worship” (Cambridge English Dictionary, 2020). Over a long period of time, many religious scholars attempted to define religion from a more global perspective that can be applied to all religions, but they failed due to the different attributes of each religion. Therefore, they agreed upon a multi-dimensional nature of its measurement. Consequently, the construct of religion has four main dimensions, namely, Beliefs, Rituals, Values, and Community (Mathras et al., 2016). While the person’s religiosity level, simply, refers to his/her adherence level to the affiliated framework of religion (Elhoushy & Jang, 2020). To illustrate, various religions influence people's perceptions of clothing style, fasting, eating, and wasting food. However, this influence is attributed to their commitment (religiosity) to their religious teachings.

Increasingly, religion shapes our lives, with more than 80% of the worldwide nation affiliating with religion in 2012 (Mathras et al., 2016). Consequently, it is responsible for shaping consumer behaviour which affects society by shaping its principles and spreading them across a population (Al-Hyari Khalil et al., 2012; Agarwala et al., 2019). For example, many public holidays are mostly related to religion, which offer free time for entertainment and shopping. In addition, France in 2020 witnessed a real effect of Muslims’ boycotting on its economy after the French president affixed an individual accident to the Islamic religion (BBC, 2020).

To this end, some teachings in various religions trigger food waste reduction practices, even at the current early stages of business research (Elhoushy & Jang, 2020), the teachings have existed too early. With this respect, the Holy Qur’an says, “*...eat and drink, but do not waste; surely [Allah/God] does not love the wasteful*” (Qur’an 7, 31)”. As well as prophet Mohamed Peace and Blessing Upon Him (PBUH) encourages food sharing and donation by saying, “*He is not a believer whose stomach is filled while his neighbour goes hungry*” (Sunnah, Al-Adab Al-Mufrad 112).

Apart from the above, individual religiosity can be attributed either intrinsically or extrinsically (Souiden et al., 2018). As well as various measures have been used to quantify it, among them; religious affiliation, frequency of

worship house attendance, frequency of prayers, donating to the worship houses, or Holy book literacy (Martin & Bateman, 2014). Moreover, four dimensions are recommended to test the role of religiosity in consumer behaviour rather than testing religious affiliation as a control variable (Mathras et al., 2016; Agarwala et al., 2019).

2.4.3.2 Religiosity/Religious commitment

In business and related studies, an individual religiosity level has been studied within the frame of spirituality, religiousness, Christianity, ...etc (Agarwala et al., 2019). Hence, the abovementioned differentiations explain the difference between these topics. Moreover, religiosity differs from religious affiliation. With this respect, the narrow definition of religiosity refers to the adherence degree to a religion or a framework of religious values, beliefs, and practices and use in daily living (Worthington, 1988) which means religiosity is the religious commitment (Worthington Jr et al., 2003). To this end, it is worth mentioning that the terms “religiosity”, “religiousness”, and “religious commitments” are used interchangeably in marketing literature (Minton, 2023). Accordingly, religious commitment can be divided into two main classes: intrinsic and extrinsic. Subsequently, while the intrinsic religious commitment affects our everyday lives by inspiring us through the rules, convictions, and ideology, the extrinsic part practically affects our lives by practicing the affiliated religious teachings (Jiang et al., 2019).

To this end, an old, very wide definition of religiosity as religious affiliation, frequency of worship houses visiting, and donations to the worship institutions prohibited the researchers from showing its importance. Therefore, the research orientation has been shifted from studying it as a control/moderator categorical variable of single-item questions to studying it as a predictor(independent), explanatory(intervening/mediator) variable, or even criterion variable (dependent). Hence, measuring its detailed importance in an applied study required scholars to develop a multi-item measurement (Martin & Bateman, 2014). Accordingly, well-validated and reliable measures based on the 10-item Religious Commitment Inventory (RCI) (Worthington Jr et al., 2003) have been adopted to do so since it is the most commonly consistently used scale in the top 20 marketing journals (Minton, 2023).

2.4.3.3 Importance of studying religiosity

Studying the religiosity effect has been broadened to the business and marketing literature. In this vein, religious commitment research has been extended from health, sexual behaviour, delinquency, and ethics to consumer behaviour (Agarwala et al., 2019). Consumer behaviour issues like materialism, status-seeking, impulsive buying, adopting new products, brand selection, pricing, promotion, evaluating products, and consumerism are significantly influenced by a consumer's religiousness (Agarwala et al., 2019). Specifically, uneven religious commitment degrees affect consumer lifestyle variables (i.e., opinion leadership, risk avoidance, credit purchase) and shape the shopper profile (i.e., demanding, practical, trendy, traditional, economic, thoughtful, and innovative) (Essoo & Dibb, 2004). For instance, consumers with low levels of religious commitment tend to favour rational appeals over emotional ones, while those with high levels of religiosity show no significant difference in their response to the two types of appeals (Cabano & Minton, 2023).

Moreover, based on the systematic literature review (Agarwala et al., 2019), the research on religiosity's role in consumer behaviour can be divided into six main streams: materialism, intolerance, consumer ethics, risk aversion, attitude toward religion-attached products, and economic shopping behaviour studies. First, the materialism-based research includes conspicuous consumption, brand and fashion consciousness and attitude toward luxury brands. Second, the intolerance group of research includes religious-based animosity and boycotting feelings or behaviour. Further, the third group of research includes ethical beliefs, values, and judgement behaviour research. In addition, the risk-evaluated research based on consumer religion, brand/store loyalty/switching, and adopting new products can be grouped together in the risk-aversion group. Fifth, studies that focus on studying the product that has a religious connection (i.e., Halal products). Finally, the price consciousness based on consumer religiosity research, such as buying on sales period preference and barely engaged in compulsive buying, can be grouped together in the economic shopping behaviour (Agarwala et al., 2019).

For instance, the research proves that boycotting can be triggered by religion and the degree to stick to it is positively correlated to consumer religiosity.

For example, Danish companies suffered from Muslim consumer boycotts after publishing the prophet Mohamed's (PBUH) caricatures in a Danish newspaper. This boycotting is only induced by the religious commitment level (Al-Hyari Khalil et al., 2012). To this end, the six pillars of the religious consumer behaviour-based research can be extended by adding the religious-environmentalism. This group of studies focuses on the relationship between consumer religiosity and his/her environmental behaviour. Eco-centric attitude, sustainable consumption, and food waste management-related studies can be grouped together in this category.

More specifically, the eco-centric behaviour/attitude derived from religious commitment has a significant positive effect on voting to protect the environment, recycling, watching TV shows that increase environmental awareness, switching from product/store/brand because of environmental issues, and buying products made from recycled materials (Martin & Bateman, 2014). Yet, the results showed weak to moderate effect sizes due to ignoring testing the mediation role of the eco-centric attitude in the relationships between religiosity and dependent environmental behaviours. Moreover, with regard to sustainable behaviour, the research provided evidence to purchasing green cleaning supplies, recycling, and purchasing organic food (Minton et al., 2015), environmental predisposition (Raggiotto et al., 2018) such as food waste behaviour that is induced by consumer religiosity.

Finally, the religious effect on food waste management has been controversially presented in the literature. The inconsistent results show that the higher religiosity consumer has a higher diet food consumption mind while the religious consumer has a non-significant effect on sustainable food consumption (Minton et al., 2019). This supports the non-significant or negative relationship between religiosity and environmental behaviour (Martin & Bateman, 2014). However, religiosity is also proven to have a significant positive effect on food waste management intention (Elhoushy & Jang, 2020). This contradiction in the effect of religiosity on food waste management can be attributed to the sample heterogeneity in Minton and her colleagues' study, which was biased toward one religion over other religions. Therefore, testing the religiosity effect requires a homogeneous sample. As well as figuring out that effect, the research should

study the effect of the religiosity dimensions instead of testing the general commitment level.

2.4.3.4 Key dimensions of religiosity

This section illustrates the religiosity dimension starting from religious affiliation, religious commitment, internal and external religiosity, and the four dimensions of religiosity. First, the research on religiosity within the marketing context began with studying the effect of religious affiliation or belonging to a cognitive system of beliefs, values, expectations, and behaviour on a group. As group behaviour affects consumer behaviour, religion affects that consumer (Essoo & Dibb, 2004; Al-Hyari Khalil et al., 2012; Agarwala et al., 2019).

After that, marketing researchers argued that the religiosity of a consumer has more effect than religious affiliation (Essoo & Dibb, 2004; Agarwala et al., 2019) especially when studying it as a predictor, not a moderator or control variable. Accordingly, they started studying religiosity or religious commitment, as mentioned earlier (Worthington Jr et al., 2003; Jiang et al., 2019). Worthington et al., (2003) have divided religion into two main categories, namely, religious affiliation and religious commitment. They also provided support to people with a high religious commitment to evaluate the surrounding world within their religious framework, which is based on their religious values, thus incorporating it into their daily lives. This religious commitment affects the consumer's behaviour and his/her lifestyle (Martin & Bateman, 2014). However, measuring the religiosity depending on a single-item or multi-item scale of first-order construct limits the accuracy of the results.

Accordingly, the marketing research of religiosity dimensions shifts from a general wide construct to classify religiosity into internal and external. While the intrinsic religious commitment affects the consumers to keep their daily lives adequacy with their religion's framework, extrinsic religious consumers tend to be involved in religious activities to meet their personal needs. This means that internal (external) religiosity boosts the consumer to live (use) his religion (Souiden et al., 2018; Jiang et al., 2019). Although the research supports the positive effect of the intrinsic effect on the attitude towards luxury brands, and extrinsic religiousness has a positive effect on self-presentation attitudes (Arli et

al., 2016), different religions have different principles that affect consumer behaviour. Hence, marketing researchers investigated various detailed dimensions of the religiosity effect. To this end, religiousness, recently, can be divided into four main dimensions: Beliefs, Rituals, Values, and Community (Mathras et al., 2016).

Further, each religion should clearly have these four dimensions. First, individual religious beliefs include the commonly held sacred truths and symbols that make the believer think s/he is right (Mathras et al., 2016). Among these beliefs are God's superior concepts, supernatural agents, external sources of control, and divine retribution. For example, Islam and Christianity have a divine retribution belief in judgement day. Similarly, Buddhism and Hinduism have the same belief in the Karma concept (Agarwala et al., 2019). Marketing research provides evidence on how the individual religious beliefs can affect his behaviour. In this regard, the higher the divine retribution belief, the less unethical the act. As well as the higher exclusivism religious belief, the less tolerance in the marketplace (Agarwala et al., 2019). Moreover, the belief in death and mortality drives consumers to be more materialistic. Yet, the religious belief of the afterlife mitigates the materialist's behaviours, self-branded connections, luxury brand acquisitions (Mathras et al., 2016).

In addition, a religion must have its own repeated behaviours that have symbolic meaning(s) as rituals. These rituals are guided by a script and implemented in the same form each time (Mathras et al., 2016). Typically, prayers are the main religious rituals in each religion. For example, Islam has five pillars of rituals, which believe in the One God alone and not accompanying anyone with him, praying five times per day to God, paying excess money to poor persons, fasting during the holy month of Ramadan, hajj pilgrimage if you are able to. Denying one of these rituals means you are not following the Islamic religion. Neglecting one of these rituals means you are a big sinner. Most importantly, doing one of these rituals in a different way from the prophet Mohamed (PBUH) did mean your prayer was not accepted because you did not follow the roots of prophet Mohamed (PBUH). Mathras et al. (2016) reported religious rituals in other religions, such as the Holy Communion and cleansing confession in Catholicism, the Passover Seder in Judaism, the Puja early morning offering in Hinduism, and

daily meditation in Buddhism. In this regard, the cleansing confession about environmental transgression is followed by more environment-friendly behaviours. Accordingly, religious ritual believers will have more environmental and sustainable behaviours in the future (Mathras et al., 2016). Similarly, praying has a significant positive effect on the consumer's mood that will mitigate his material self (Agarwala et al., 2019).

Moreover, religions differently prioritize the basic types of human values. These values can be categorized into 10 types, namely, Power, Achievement, Hedonism, Stimulation, Self-direction, Universalism, Benevolence, Tradition, Conformity, and Security (Schwartz & Huismans, 1995). Religious values affect the consumer's daily life by increasing his/her helping, donating, and volunteering behaviours even outside his religion's institutions (Mathras et al., 2016). In this regard, religious values affect consumption behaviours in many ways. For example, consumers with frugality religious values tend to be more economical shoppers (Agarwala et al., 2019). As well as it is confirmed that the consumer's religious values shape his shopping profile (Essoo & Dibb, 2004) and other shopping/consumption behaviours (Mathras et al., 2016). Consequently, marketing research on religion should focus on the specific values that have priority in a specific religion. This is in line with incorporating the religious commitment as a segmentation tool to target and position the social marketing strategies (Agarwala et al., 2019).

The fourth and final dimension of the religion is the community. With this respect, the religious individual starts his religiousness by affiliating to a group and behaving according to the group framework of beliefs, rituals, and values. In turn, the religion community helps the religious individual by satisfying his needs for a sense of self and social identity, individual and social support, and well-being. Within the marketing research context, belonging to a community triggers the consumer to buy some products that signal his membership to this group. Accordingly, the religious community offers the ground for conspicuous purchases or accepting higher risk purchasing to be noticed to overcome social rejection, restore their belonging image, or give others certain images (Al-Hyari Khalil et al., 2012; Mathras et al., 2016). Accordingly, the research should focus

on the consumer's belonging status to a religious commitment as his behaviour may be reasoned by this status.

Apart from the above, another recent attempt at these investigations was limited only to the Islamic religion (Souiden et al., 2018). Their study depended only on three main principles: fear of divine punishment, religious beliefs, and religious involvement. These three Islamic dimensions have a significant negative relationship with counterfeit product purchasing intention (Souiden et al., 2018) which extends the positive effect to Islamic products (e.g., Islamic banking) (Souiden & Rani, 2015). Although the relationships are expected and supported among Muslim believers, the research in Islamic teachings to provide rigorous religious dimensions in the marketing context is under development. However, the current Islamic attempt is limited only to the Islam religion and does not extend the four dimensions of the Marthas et al., (2016) work. Instead, it limits it to three of four religious dimensions as it ignores the community dimension.

2.4.3.5 Limitations in religiosity and food waste

Correlating food waste management with meanings of religious rituals, beliefs, values, and community may frame consumer awareness about the issue to reduce food waste. In this regard, accompanying the positive meaning of the four religious dimensions instead of warning messages of disobeying god and religious teachings may reduce food waste. The consumer prefers the positive meaning of the messages that resonate with consumers and are easily transmitted from consumer to consumer (Närvänen et al., 2018). When the consumer is *excluded* from the religious community, his/her conspicuous buying behaviour can take place to restore his/her membership in the community rather than the religious beliefs, rituals, or values. Hence, caution should be taken into consideration when targeting the consumer and creating his/her awareness about food waste management. At the same time, *various levels* of religiosity should be characterized by the most, moderate, least, and non-religious consumers (Souiden et al., 2018). As well as, the research should activate *one identity* of the consumer- the religious community can activate a multitude of personal identities.

In this regard, the current research activates the identity of *the responsible women for the Muslim family* by wording the questions using family identities and Islam teaching related to food waste. In addition, there is a paucity of discriminating and positioning the religion from the personality attributes (Mathras et al., 2016). Since religious beliefs, rituals, values, and community may interact with the consumer personality traits, especially religious consumers, studying them to discriminate the four dimensions of religiosity is indeed crucial. Moreover, data collection in online platforms can be reasoned by reducing the bias of *social desirability* in religious, emotional, and ethical questions.

2.5 Consumer materialism

This section is devoted to highlighting the importance of materialism and its various perspectives on studying it, as presented in table 2-4. Then, it discusses the materialism definitions to limit its use in the current research. After that, the main theories and application contexts of materialism are reported. Finally, a conceptual model of well-documented key drivers, consequences, and possible moderators of materialism is discussed.

Table 2-4, Summary of materialism-related Literature Review

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
(Zhao, T. et al., 2023)	-Explores the negative effects of using shared products on consumer happiness.	-IV (shared vs owned products), psychological ownership -ZV (materialism, perceived financial constraints -DV (happiness)	-Scenario-based experiments and questionnaires.	-Compared with using owned products, using shared products diminishes consumer happiness by reducing psychological ownership. This effect is more pronounced among materialistic consumers and those experiencing higher perceived financial constraints.
	-Similarity/benefits to the current research: studying materialism as a moderator in predicting a sharing economy-related product is like studying the Ramadan banquets and its related food consumption.			
	-Differences from the current research: studying consumer materialism as a moderator, while the current research studies materialism as a mediator.			
(Haberlin & Atkin, 2022)	-Explores how mobile games are used to escape reality and manage stress in developing a ritualised media use orientation.	-Uses and gratifications theory. -IV (materialism) -MV (internet addiction) -DV (money spent) -ZV (social support)	-Purposive online survey of mobile game users	-There are positive relationships between materialism and internet addiction and between internet addiction and the amount of money spent. Additionally, materialism is positively related to internet addiction, while social support is negatively related to internet addiction. However, social support does not moderate the relationship between materialism and internet addiction.
	-Similarity/benefits to the current research: studying materialism as a predictor to money spent is like the current research that focuses on the materialism as a regulator behaviour means to support the social identity.			
	-Differences from the current research: this research studies materialism as a predictor, while in the current research, it is addressed as a mediator. Also, this research uses gratification theory, while the current research is grounded on social identity theory.			
(Reyes et al., 2021)	-Testing the longitudinal mediating effects of gratitude in the relationship between materialism and need satisfaction/frustration.	-self-determination theory -IV (materialism) -DV (satisfaction/frustration) -MV (gratitude)	-Three-wave longitudinal design among Chilean adults	-Materialism increases the need for frustration over time, both directly and indirectly, through the mediation of gratitude. Gratitude, in turn, reduces the need for frustration. Theoretical and practical implications are discussed.

Article details	Aim and objectives		Theory and variables*	Methodology	Results
Citation					
	-Similarity/benefits to the current research: materialism increases the level of frustration, like the current research that hypothesizes materialism as a predictor to unethical behaviour which leads at the end to increased levels of negative emotions.				
	-Differences from the current research: this research studies materialism as a predictor, while in the current research, it is addressed as a mediator. Also, this research uses self-determination theory, while the current research is grounded on social identity theory. Finally, this research uses 3 waves of longitudinal research, while the current research uses multiple studies in a cross-sectional design.				
(Dinh & Lee, 2021)	-Examining how the imitation of influencers affects customer buying intentions toward endorsed products, with social comparison, materialism, and fear of missing out (FOMO) acting as mediators.	-FOMO -IV (imitation of social media influencers) -DV (customer buying intentions) -MV (social comparison, materialism, and FOMO)	-Online survey via Mturk	-Imitation of influencers significantly impacts social comparison, materialism, and FOMO, which in turn affect buying intentions towards endorsed products.	
	-Similarity/benefits to the current research: studying materialism as a mediator between imitation of social media influencers and consumer buying behaviour is similar to the current research studying materialism as a mediator between social identity-related factors and intentions of food waste behaviour. Also, an online survey was used in the current research.				
	-Differences from the current research: this research studies the purchase intention of the endorsed products, while the current research focuses on the behavioural intentions of food waste. Also, this research uses the fear of missing out theory, while the current research is grounded on social identity theory.				
(Islam et al., 2021)	-Examining the roles of face consciousness, materialism, and emotions in sustainable luxury brand consumption (SLBC) among millennials in a collectivist society.	-The self-construal framework -The social identity theory -IV (face consciousness) -DV (SLBC) -MV (materialism) -ZV (authentic pride, high-risk embarrassment)	-Three experimental design studies using scenario-based methodologies along with the survey method were conducted in China	-Face consciousness negatively and significantly affects sustainable luxury brand consumption (SLBC), with materialism mediating this effect. However, when millennials experience great, authentic pride, face consciousness positively influences SLBC. Additionally, when millennials face a high risk of embarrassment, materialists' willingness to engage in SLBC increases.	
	-Similarity/benefits to the current research: this research depends on the social identity theory like the current research. Also, it uses materialism as a mediator between face consciousness and sustainable luxury brand consumption, like the current research that focuses on social identity-related factors and sustainable consumption of food.				
	-Differences from the current research: this research is applied in China, while the current research is applied in Muslim-dominated communities. Also, the main outcome of sustainable luxury product consumption is related to sustainability issues, but it is different from the group consumption of food during Ramadan banquets.				

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
(Habib & Bekun, 2021)	-Exploring the effects of intrinsic and extrinsic religiosity on beliefs, risk aversion, and life satisfaction and how these factors are ultimately associated with impulsive buying tendencies.	-Values Attitude and Behaviour (VAB) -Consistency theory -IV (religiosity Islam) (intrinsic and extrinsic) -DV (impulsive buying behaviour) -MV (materialism, risk aversion, life satisfaction)	-Cross-sectional survey, mall intercept in Pakistan	-Empirical findings support a significant association between religiosity, materialism, risk aversion, and life satisfaction. Beliefs can translate into impulsive buying tendencies. Materialism, risk aversion, and life satisfaction were identified as significant mediators between religiosity and impulsive buying tendencies. Higher levels of materialism are linked to increased impulsive tendencies.
	-Similarity/benefits to the current research: this research guides the current research by studying the relationship between religiosity and unsustainable/irresponsible behaviour and the mediation role of materialism. Also, a cross-sectional survey in Muslim-dominated communities like Pakistan is like the current research.			
	-Differences from the current research: this research uses a value-attitude-behaviour framework, while the current research is grounded on social identity theory.			
(Lavuri, 2021)	-Examining the effects of intrinsic factors—such as perceived utilitarian value, hedonic value, materialism, fashion interest, and enjoyment—on impulsive online shopping, with trust and online shopping attitude serving as mediators, in the Indian emerging market.	-Stimulus–organism–response (s–o–r) -IV (perceived utilitarian, hedonic value, materialism, fashion interest, and enjoyment) -DV (impulsive online shopping) -MV (trust and online shopping attitude) -Control variables (age, gender, income, education, occupation)	-443 Indian respondents, using purposive and snowball sampling	-Perceived utilitarian value, hedonic value, materialism, and enjoyment significantly influenced perceived trust and online shopping attitude, while fashion interest had no effect. The mediating factors positively impacted impulsive online shopping and demonstrated a significant association between intrinsic factors and impulsive online shopping.
	-Similarity/benefits to the current research: this research guides the current research by depending on the stimulus-organism-response model to ground the current research. It also uses materialism to predict unsustainable/irresponsible impulsive buying behaviour, like the current research by using materialism to predict food waste behaviour. Moreover, it guides the current research by studying the demographic factors of age, income, education level, and occupation as control variables.			

Article details				
Citation	Aim and objectives	Theory and variables*	Methodology	Results
	-Differences from the current research: this research focuses on the Indian market, while the current research focuses on Muslim-dominated markets. Also, the fashion industry is the application field of the study, while the current research focuses on food waste behaviour.			
(Fazli-Salehi et al., 2021)	-Exploring the impact of consumer self-concept clarity and materialism on self-brand connection, communal-brand connection, and purchase intention within the context of ethnically matched, mismatched, or multi-ethnic advertising.	-The self-concept, self-brand connection, communal-brand connection, social identity theory, self-expansion theory, self-concept clarity -IV (self-concept clarity) -MV (materialism, self-brand connection, communal brand connection) -DV (purchase intentions) -ZV (match/mismatch/multi-ethnic)	-Online surveys were distributed via email to a sample of students at southwestern universities in the U.S. -Manipulations were assigned using a between-subjects design.	-Self-concept clarity negatively impacts self-brand connection and communal-brand connection in ads featuring multi-ethnic models but not in ads with ethnically matched or mismatched models. Materialism did not affect self-brand or communal-brand connection in any of the conditions. A negative relationship between self-concept clarity and materialism was observed in the multi-ethnic model context but not in ads featuring ethnically matched or mismatched models.
	-Similarity/benefits to the current research: this research guides the current research by depending on the social identity theory to ground the current research. More specifically, it studies materialism as a mediator between self-related contracts and purchase intentions like the current research, with a slight change from purchase intention to intention to food waste behaviour. Also, it includes the multi-ethnic as a moderator variable, which guides the current research to use country-related factors like culture and development levels.			
	-Differences from the current research: while this research focuses on purchase intentions of ads-matched products, the current research does not include the match/mismatch brand connection. Also, this research is applied to the US, while the current research is applied to Muslim-dominated communities.			
(De Silva & Wijesundara, 2021)	-Examining the fashion consciousness of young adults in Sri Lanka and explaining the impact of materialism on fashion consciousness, as well as the moderating effect of internet innovativeness on the relationship between materialism and fashion consciousness.	-IV (materialism) -DV (fashion consciousness) -ZV (internet innovativeness)	-Structured questionnaire survey	-Materialism significantly predicts fashion consciousness. There is no moderating effect of internet innovativeness on the relationship between materialism and fashion consciousness.
	-Similarity/benefits to the current research: studying materialism as a predictor of consumer consciousness is similar to the current research when studying materialism in predicting consumer awareness of the eat-relating Islamic teaching. Also, structured questionnaires were used in the current research survey study as well.			

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
	-Differences from the current research: also, this research is applied to young adults in Sri Lanka, while the current research is applied to Muslim families in Muslim-dominated communities.			
(Cui, P. et al., 2021)	-Proposing that hedonic motives are more likely to lead to unethical behaviour than eudaimonic motives, with materialism serving as a mediator.	-Goal system theory -Goal setting theory -IV (hedonic motives) -DV (unethical behaviour) -MV (materialism) -ZV (self-control)	-Questionnaire-based survey	-Hedonic motives induce unethical behaviour through the mediation of materialism and positively predict unethical behaviour even when controlling for eudaimonic motives. Self-control moderates the relationship between materialism and unethical behaviour.
	-Similarity/benefits to the current research: this research guides the current research in studying the mediation effect of materialism between psychological variables and unethical behaviour such as food waste. Also, structured questionnaires were used in the current research survey study as well.			
	-Differences from the current research: also, this research uses the fear of goal system and goal setting theories, while the current research is grounded on social identity theory.			
(Li et al., 2021)	-Examine the relationship between material parenting and materialism, as well as the underlying mechanisms.	-Material parenting dimensions (conditional material rewards, unconditional material rewards, and material punishment) -IV (early material parenting dimensions) -DV (adolescent materialism) -MV (overt narcissism).	-Pairing questionnaire parent-child -Large sample survey on Chinese adults	-Conditional and unconditional material rewards positively predicted materialism, with overt narcissism mediating this relationship. Early material parenting may lead to overt narcissism in children, which, in turn, fosters materialistic values during adolescence.
	-Similarity/benefits to the current research: this research guides the current research in studying group consumption behaviour as material parenting can affect children's materialism. Also, structured questionnaires were used in the current research survey study as well.			
	-Differences from the current research: this research is applied in China, while the current research is applied in Muslim-dominated communities.			
(Raggiotto et al., 2018)	-Explores how environmental predisposition affects purchasing intentions.	-IV (intrinsic and extrinsic religiosity) -MV (materialism) -DV (ecologically conscious consumption behaviour)	-This work is hence set within vegan consumption. Veganism has been mostly related to	-Religiosity influences consumer environmental predisposition, which in turn affects vegan purchasing intentions. Intrinsic religiosity negatively impacts materialism. Both intrinsic and extrinsic religiosity, along

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
		ECCB, vegan purchasing intentions)	specific religious beliefs (like Buddhism), according to which it represents a core component of larger worldviews. -Surveying a sample of 842 Italian consumers.	with materialism, are significant predictors of environmentally conscious consumer behaviour (ECCB), which significantly predicts vegan purchasing intentions. Extrinsic religiosity positively influences materialism. Materialism mediates this relationship and negatively impacts ECCB. Multigroup analysis reveals that the effect of religious influences on consumer environmental predispositions varies across different faiths.
	-Similarity/benefits to the current research: this research guides the current research in studying the mediation effect of materialism between religiosity and sustainable behaviour such as ecologically conscious consumption behaviour. Also, structured questionnaires were used in the current research survey study as well.			
	-Differences from the current research: this research focuses on vegan consumers, while the current research does not. Also, this research is applied in Italy, while the current research is applied in Muslim-dominated communities.			
(Santini et al., 2018)	-Presenting the antecedents associated with how advertising and friends' behaviours influence the development of materialistic behaviours in youth.	-IV (susceptibility towards advertising, perceived friend norm) -DV (materialism)	-Meta-analysis	-The constructs directly associated with susceptibility to advertising include attitudes towards advertising, attention to advertising, celebrity endorsements, advertising exposure, and tv viewing frequency. For perceived friends' norms, the relevant constructs are friends' attitudes, social comparisons with friends, and communication with friends, all of which relate to materialism in youth.
	-Similarity/benefits to the current research: this research guides the current research in understanding that consumer materialism is driven by social identity-related predictors such as perceived friend norms.			
	-Differences from the current research: this is meta-analysis research, while the current research depends on primary field data collection from Muslim communities.			
	-Examining antecedents of the intention and behaviour towards buying counterfeit luxury goods	-Theory of planned behaviour (TPB)	-The data was obtained from university	-Materialism, specifically the centrality component, positively impacts attitudes towards purchasing counterfeit luxury

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
(Mai & Linh, 2017)	among young consumers in Vietnam, an emerging Asian economy.	-IV (attitude, subjective norms, and PBC) -DV (purchase behaviour) -MV (materialism-centrality, purchase intentions).	undergraduate students in Hanoi, the capital of Vietnam	goods. Both attitude and subjective norms towards counterfeit luxury goods are positively related to purchase intention. However, perceived behavioural control does not directly affect purchase intention. Despite this, perceived behavioural control and purchase intention are significant predictors of actual purchase behaviour.
	-Similarity/benefits to the current research: this research uses the theory of planned behaviour, like the current research using the theory of reasoned action, to establish the relationships between materialism and unsustainable/irresponsible purchase intentions of counterfeit products, similar to food waste behaviour. Moreover, this research uses materialism with specific dimensions and centrality, which guides the current research to focus on the dimensions of materialism rather than the unidimensional measurement level.			
	-Differences from the current research: this research is applied in Vietnam, while the current research is applied in Muslim-dominated communities.			
(Santini et al., 2017)	-Assessing the antecedents and consequences of materialism.	-Iv/DV (materialism) -IV (perceived hedonic value, interpersonal influence, life satisfaction, gender, age, and income) -DV (purchase intention, impulsive buying, compulsive buying, conspicuous consumption, status consumption, and consumer involvement) -ZV (sample size, countries, sample type, study location)	-Meta-analysis	-Significant antecedents of materialism include perceived hedonic value, interpersonal influence, life satisfaction, and income. The consequences of materialism are purchasing intention, impulsive buying, compulsive buying, conspicuous consumption, status consumption, and consumer involvement. Small sample sizes tend to show stronger effects. Additionally, surveys conducted in Western countries reveal stronger effects on the relationship between materialism and purchase intention.
	-Similarity/benefits to the current research: this research guides the current research in understanding the consumer materialism concept and its related antecedents and consequences. For instance, it is driven by social identity-related predictors such as perceived interpersonal influence, and it leads to negative outcomes such as compulsive buying behaviour.			
	-Differences from the current research: this is metal-analysis research, while the current research depends on primary field data collection from Muslim communities.			

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
(Kasser, 2016)	-Investigating methods to reduce materialism in individuals.	-Value and goal system	-Review article	-Interventions to reduce materialism are proposed, addressing its psychological conflict with prosocial and pro-environmental behaviour, interpersonal connections, educational motivation, and personal well-being. Materialistic goals are linked to higher levels of compulsive consumption, lower personal well-being, more physical health problems, and more ecologically destructive attitudes and behaviours.
	-Similarity/benefits to the current research: this research guides the current research in studying the conflict between psychological factors and sustainable/responsible consumption behaviour.			
	-Differences from the current research: this research is based on value and goal system framework, while the current research focuses on social identity theory. Also, this is literature review research, while the current research depends on primary field data collection from Muslim communities.			
(Adib & El-Bassiouny, 2012)	-Gain a deeper understanding of youth materialism in Egypt and the role of parental influence in transmitting materialistic values, with the aim of developing recommendations and programs to curb this phenomenon.	-Consumer socialisation model -IV (parent materialism) -DV (children materialism) -MV (indirect, restrictive, and active mediation practices)	-Interviews and surveys with parents and children	-There is a positive correlation between parental materialism and child materialism. Indirect mediation, followed by restrictive mediation practices, significantly mediate this relationship. Active mediation practices also have an indirect mediation effect.
	-Similarity/benefits to the current research: mixed method research of interview and survey guides the current research to use mixed methods. Also, the paired questionnaires of parents and children guide the current research in studying group consumption behaviour.			
	-Differences from the current research: while this research focuses on materialism only, the current research extends the literature by including it as a mediator between social identity-related factors and responsible consumption of food.			

* IV (Independent variable), DV (Dependent variable), ZV (Moderator variable), and MV (Mediator variable)

2.5.1 Materialism importance

To introduce materialism in the current conceptual model, the marketing literature and psychology in marketing literature were reviewed (Santini et al., 2017). Studying materialism in sustainability and consumer behaviour is essential since it affects the materialistic one's perception of satisfaction, well-being, and judgement (Santini et al., 2018). For instance, studying the materialism is inevitable to understand its two opposite consequences. First, the positive effect of materialism on boosting economic growth. Second, the negative effect on the consumer ethics (Srikant, 2013). However, studying the materialism in marketing have various perspectives.

2.5.2 Materialism perspectives

2.5.2.1 Good vs. neutral vs. bad phenomenon

Although materialism is a multifaced construct with multi-dimensions, the research intensively identified it as a negative psychological concept that should be avoided (Srikant, 2013). To this end, the good and neutral materialism did not receive the much attention in the marketing research as the bad perspective.

Good materialism has yet to be proved; however, it can be incorporated as a driver to trigger compensatory consumption behaviour in order to manage self-threats and reconstruct self-concepts (Loh et al., 2021). In addition, from an economic point of view, materialism has a positive effect on the economic growth rate since it pushes the economy to consume, which in turn leads to producing more. For instance, it sustains the loop between production and consumption. Similarly, some materialistic persons showed conservatory behaviour towards sustainable issues (Dang et al., 2021). Also, materialistic persons raise the level of the civilization, which makes society happier (Srikant, 2013).

On the contrary, the negative viewpoint of materialism has been remarkably reported in the literature since it has been characterized as the importance that can be given to materialistic objects over spiritual values. For instance, it is considered as wasteful to make one live today and celebrate the body, which gorges the youth with impossible promises, which leads to unethical behaviours to avoid bad fate, i.e., debt and bankruptcy (Srikant, 2013), lower-quality interpersonal relationships and well-being (Kasser, 2016). Finally, the

“positive perception of materialism is linking materialism to empowerment, freedom and self-actualization, which is the perception held by the Romans”, as mentioned by Adib and El-Bassiouny (2012).

To this end, Nevertheless, neutral materialism can be either instrumental or terminal (Csikszentmihalyi & Halton, 1981). While instrumental materialism refers to the acquisition of material objects that may enhance the individual's goals, such as happiness, longevity, and safety, terminal materialism refers to acquiring material objects for their own sake (Adib & El-Bassiouny, 2012; Srikant, 2013).

Ultimately, scholars noted that materialism is used freely and loosely by limiting it to a good or bad perspective. Hence, a neutral understanding of materialism requires a new perspective rather than good vs. bad. The evolved way of studying materialism is the individual vs. sociocultural perspective (Richins & Dawson, 1992; Srikant, 2013).

2.5.2.2 Individual vs. socio-cultural level materialism?

Materialism is a complex concept that interplay between the individual and sociocultural dimensions. An individual's level of analysis consistently shows that materialism is associated with several psychological illnesses (e.g., depression, loneliness, and paranoia), conflict between spouses, the tendency to engage in shoplifting, borrowing money, alcohol abuse, and less happiness and life satisfaction levels (Srikant, 2013; Kasser, 2016; Santini et al., 2017). At the same time, the materialism is induced by fulfilling the need of happiness (Richins & Dawson, 1992), power, and identity (Belk, 1985; Loh et al., 2021) to obtain the joy, excitement, and contentment throughout the buying behaviour process (Ni, 2021).

However, from the socio-cultural level of analysis, the materialism outbreak is associated with the Western post-industrial age. Developing countries excessively emulate Western materialistic behaviour. In some situations, luxury product consumption replaced the basic ones in developing countries to fulfil the need for social desirability (Cleveland & Chang, 2009). Moreover, materialistic values contradict the societal values of justice and equality since almost 20% of the world population overconsumes 86% of the

world's goods. This eventually led to lower environmental and sustainability concerns among materialists, simultaneously sustaining the consumption-production loop (Srikant, 2013). To this end, the materialism definition and dimensions can be discussed.

2.5.3 Materialism definition

As the materialism schools of thought differ, the way materialism is defined varies as well (Kilbourne & Pickett, 2008; Raggiotto et al., 2018; Reyes et al., 2021). Accordingly, defining materialism varies from studying it in personality traits (Belk, 1985) or value/belief system (Richins & Dawson, 1992) as the seminal effort in this regard (Bagozzi et al., 2020). From the personality traits point of view, Belk (1985) defines materialism as “the importance a consumer attaches to worldly possessions”, which implies the materialism personality trait presence. This materialism trait scale has three subscales, which are possessiveness, non-generosity, and envy. However, the inconsistency in the scale led to the materialism as a consumer value (Richins & Dawson, 1992). The materialism value refers to “the importance a person places on possessions and their acquisition as a necessary or desirable form of conduct to reach the desired end state, including happiness” that has three dimensions as well (i.e., position-success, acquisition-centrality, and acquisition-happiness”.

Moreover, there are some other efforts to define and measure materialism from different points of view (Srikant, 2013) such as Materialism in the goals and aspiration system (Kasser & Ryan, 1993), adolescent attitude towards materialism (Moschis & Churchill Jr, 1978), consumer involvement in childhood materialism (Schor, 2004), materialism at the societal level due to economic insecurity (Inglehart, 1990), attitude towards money and material objects in a possession index scale (Scott & Lundstrom, 1990), and youth materialism scale (Goldberg et al., 2003). However, the current research depends on the Materialism Value Scale (MVS) (Richins & Dawson, 1992) due to its widespread in the recent marketing literature (Srikant, 2013; Santini et al., 2017; Reyes et al., 2021), as a well-established validated scale (Richins, 2004; Bagozzi et al., 2020). Hence, the three dimensions of materialism can be discussed within MVS.

2.5.4 Materialism dimensions

Although materialism is triggered by seeking happiness, the negative relationship between materialism and happiness has consistently been proven (Kasser et al., 2014). Three dimensions have been validated to measure the MVS. First, position success refers to the belief that a person's success depends on the material objects/he owns. Second, the acquisition centrality refers to the importance (centrality) that is given to obtaining material objects in the materialist's life. Finally, acquisition as a pursuit of happiness refers to what extent possession of the material object holds the happiness and wellbeing (Richins, 2004).

2.5.5 The main contexts of studying the materialism

Although reviewing the materialism literature concentrated in marketing and psychology in marketing, studying materialism is focused in more than a single marketing area. Accordingly, materialism is well-researched in the social media context (Lee et al., 2021; Dinh & Lee, 2021), mobile gaming (Haberlin & Atkin, 2022), internet and technological addiction (Haberlin & Atkin, 2022), online shopping (Lavuri, 2021), fashion and clothing industry (De Silva & Wijesundara, 2021), and luxury products and brands (Islam et al., 2021). The results are not limited only to adults but also extend to adolescents (Li et al., 2021), and children and their parents (Adib & El-Bassiouny, 2012).

2.5.6 Key theories of studying materialism

2.5.6.1 Fear of Missing Out (FOMO)

The Fear of Missing Out (FOMO) refers to the exaggerated "fear that others may be having rewarding experiences from which one is absent" (Dinh & Lee, 2021). It is associated with emotional anxiety or a desire to stay connected with peers' activities. It is clearly studied in social media as followers fear being left behind by the influencers' experience. Subsequently, people constitute their materialistic values to compare others' objects and then consume them to improve their status (Dinh & Lee, 2021; Fazli-Salehi et al., 2021).

2.5.6.2 Social comparison theory

The social comparison theory indicates that people compare their material objects with others to decide their social status. Accordingly, more materialistic values are given to objects to obtain their symbols, which will be reflected in their

personal status. This occurs by celebrities' imitation to fulfil the desire of consumption. This means the more social comparison involvement, the more materialism value induced (Dinh & Lee, 2021).

2.5.6.3 Social identity theory and self-expansion theory

Under the social identity theory, there are two types of groups: ingroup and out-of-group. An individual feels in-group (e.g., family, sports clubs, university...etc) until s/he feels out of the group. The feeling of isolation from the group you think and like to belong to triggers the need to reconstruct your lost membership. Hence, out-of-the group person formulates materialistic values by acquiring material objects that belong to the out-of-group to expand his/her identities, perspectives, and resources to experience the desired emotions that arise from this expansion (Self-expansion theory) to restore the lost membership (Fazli-Salehi et al., 2021). Accordingly, the materialism scale is susceptible to social desirability issue (Srikant, 2013; Raggiotto et al., 2018; Fazli-Salehi et al., 2021).

2.5.7 Key drivers of materialism

The key drivers of materialism can be divided into positive triggers and negative consequences. As for the positive triggers, Envy is well-reported as a consistent trigger the materialistic values (Cui, J. et al., 2021). Also, the hedonic orientation is associated with personal extrinsic goals such as money, luxury brands, and possessions. Such an attitude can induce materialistic values (Santini et al., 2017; Cui, P. et al., 2021). Similarly, within the social media context, the imitation of influencers and social comparison affect the materialism (Dinh & Lee, 2021). Moreover, interpersonal influence has a positive effect on materialism as people who are more susceptible to influence others tend to be more materialistic (Santini et al., 2017).

Moreover, the materialism can be boosted when the self-concept is destroyed and needs to be rebuilt (Fazli-Salehi et al., 2021). Similarly, self-esteem has a negative effect on materialism. However, the lack of self-esteem encourages the materialism to be reconstructed (Dang et al., 2021). Finally, the life satisfaction (Santini et al., 2017) (i.e., depression and isolation) negatively affect materialism.

2.5.8 Materialism outcomes

In developing the materialism trait scale, Belk (1985) reported the significant negative relationship between the three dimensions of materialism: envy, non-generosity and possession, and satisfaction and happiness. It also negatively affects organizational citizenship and work motivation behaviour among employees (Kasser, 2016; Cui, P. et al., 2021), and interpersonal relationships quality (Kasser, 2016). Therefore, it significantly reduces the happiness attached to the use of shared products (Zhao, T. et al., 2023), which contradicts meetings the sharing economy requirements.

It also increases the deviant behaviour (Cui, P. et al., 2021) and more destructive ecological behaviour (Kasser, 2016), incur more debt (Kasser, 2016), and frustration (Reyes et al., 2021). It also leads to the buying intentions (Dinh & Lee, 2021), especially the luxury products (Mai & Linh, 2017; Islam et al., 2021), counterfeit products (Mai & Linh, 2017), impulsive buying behaviour (Santini et al., 2017; Lavuri, 2021; Habib & Bekun, 2021), compulsive buying behaviour (Le, 2021; Owusu et al., 2021), conspicuous consumption, and status consumption (Santini et al., 2017; Fazli-Salehi et al., 2021).

2.5.9 Reported moderating variables

Among the reported moderators, the demographic factors had much attention from the researchers for their mixed results. First, the consumer gender has not been proven to have a significant effect on materialism and its related constructs (Cui J. et al., 2021). However, it has been reported that women's role in the house and sustainability issues is very different from that of men (Aka & Buyukdag, 2021; Loh et al., 2021). Additionally, consumer income testing shows no significant effect (Richins & Dawson, 1992; Cleveland et al., 2009; Cui, P. et al., 2021), yet socioeconomic status has been proven to have a significant effect (Lindridge, 2005).

Moreover, age has not shown any significant difference in many research outputs (Hurst et al., 2013; Raggiotto et al., 2018; Cui P. et al., 2021). However, it is proven that young consumers tend to be more materialistic (Cleveland et al., 2009), but Generation Y can be more materialistic than baby boomers as well (Loroz, 2006). Nevertheless, some scholars show there is no significant

difference between the students and non-students' samples (Santini et al., 2018), while others proved a significant difference between students and community samples (Hurst et al., 2013), and non-postgraduates and postgraduates (Loh et al., 2021). Finally, although the comparison between the individualistic vs. collectivistic cultures did not reveal any significant difference (Cleveland et al., 2009; Bagozzi et al., 2020), it was proposed to be tested (Dang et al., 2021) since the Western countries' materialism has a stronger effect than eastern countries on the purchase intentions (Santini et al., 2018).

2.6 Feeling of loneliness

This section is allocated to present the importance of loneliness feeling and its related consequences, as presented in table 2-5. Then, it discusses loneliness definitions and lonelier attributes. After that, the main theories are reported. Finally, key drivers, reduction interventions, and loneliness situations in the holy month of Ramadan are discussed.

Table 2-5, Summary of loneliness feeling-related literature review

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
(Altinay et al., 2023)	-Proposes and tests a conceptual model that links hospitableness, social inclusion, self-esteem, loneliness, psychological distress, psychological resilience, and subjective well-being.	-Bottom-up spillover theory -IV (hospitableness) -DV (psychological distress/ loneliness/ subjective well-being) -MV (self-esteem/ social inclusion) -ZV (psychological resilience)	-Surveying 135 Ukrainian refugees hosted by locals in Slovakia	-Findings confirm that hospitableness can positively enhance social inclusion while reducing loneliness. However, they do not confirm a positive effect of hospitableness on subjective well-being, either directly or indirectly, through self-esteem and social inclusion. Psychological resilience significantly moderates the relationship between hospitableness and social inclusion.
	-Similarity/benefits to the current research: studying the direct effect of loneliness on self-esteem and social inclusion guided this research to study the effect of loneliness on one of the regulatory behaviours; materialism. Also, the hospitableness effect on loneliness guides the research on studying the conflict between social identity-related factors and responsible consumption.			
	-Differences from the current research: this research focuses on the Ukrainian refugee market, while the current research focuses on Muslim-dominated markets. Also, this research is based on the bottom-up spillover theory, while the current research is grounded on social identity theory.			
(Loh et al., 2021)	-Explores the mechanism through which consumers use their self-brand connections and emotional attachment to brands as a way to cope with the emotional loneliness resulting from the absence of intimate relationships with close others.	-Need to belong theory/consumer-brand relationship theory/self - discrepancy theory/self - expansion theory/self - enhancement theory/self - discrepancy theory/social identity theory/self - congruity theory/attachment theory -IV (emotional loneliness) -MV (nostalgia/ materialism/ self-brand connections) -DV (emotional brand attachment/ brand loyalty).	-Online survey with 456 Malaysian working adults	-Emotional loneliness is positively associated with nostalgia and materialism, both of which mediate the relationship between emotional loneliness and self-brand connections. Self-brand connections further mediate the positive associations of nostalgia and materialism with emotional brand attachment, mediating the positive relationship between self-brand connections and brand loyalty.

Article details				
Citation	Aim and objectives	Theory and variables*	Methodology	Results
	<p>-Similarity/benefits to the current research: this research is based on multiple theories including social identity theory as the current research. Also, online surveying Malaysian adults are like the current research that focuses on the Muslim community. Also, this research focuses on one dimension of loneliness, highlighting the importance of studying the two dimensions of loneliness rather than a unidimensional measured construct.</p> <p>-Differences from the current research: while this research focuses on brand attachment and brand loyalty, the current research focuses on more sustainable consumption behaviours and food waste management. In addition, the current research studies the two dimensions of loneliness rather than the emotional dimension only.</p>			
(Rippé et al., 2018)	-Suggests that store-based retailers could achieve success by employing in-store salespersons who can meet the social needs of consumers experiencing loneliness.	-Relational theory -IV (social loneliness/emotional loneliness) -MV (shopping as social exchange/predisposition to comply with salesperson input) -ZV (adaptive sales tactics) -DV (trust in salesperson/ purchase intentions/ retail patronage)	-Surveying 301 respondents representing over 40 states from the United States of America.	-Two types of loneliness—social and emotional—affect how much consumers engage with in-store sales staff for social interaction. Additionally, a consumer's tendency to follow a salesperson's advice influences their trust in the salesperson, their intention to make a purchase, and their patronage of the retail store.
	-Similarity/benefits to the current research: this research is built on the relational theory, which supports the current research ground on social identity theory. Also, two dimensions of loneliness were used in the current research. In addition, the current research applies the survey method in two of the three studies.			
	-Differences from the current research: while this research aims to predict the purchase intention in the retailing context, the current research aims to predict the consumer intentions of food waste behaviour. Additionally, this research is applied in the US, while the current research is applied to Muslim-dominated communities.			
(Pieters, 2013)	-Test the hypothesis that consumers encounter a 'material trap,' where materialism leads to social isolation, which in turn reinforces materialism.	-Cross-cultural value theory -Self-determination theory -Attachment theory -Materialism theory	-Longitudinal data from over 2,500 consumers across 6 years and a new latent growth model.	-Materialism and loneliness are intertwined in bidirectional relationships over time. Loneliness contributes more to materialism than the reverse. However, the impact of materialism on loneliness is not uniformly negative; it varies according to different subtypes of materialism. Specifically, valuing possessions as a source of happiness or as a measure of success tends to increase

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
				loneliness, and these subtypes are also most influenced by loneliness. In contrast, seeking possessions for personal enjoyment reduces loneliness and is not significantly affected by it.
	<p>-Similarity/benefits to the current research: longitudinal research over six years guided the research to collect two rounds of data over two years. Moreover, this research is based on self-determination theory and materialism theory, which are related to the current research theoretical background. Additionally, this research guides the current research on developing the loneliness-materialism relationship. Finally, this research highlights the importance of studying materialism as a high-order construct while studying the three dimensions in detail, which is applied in this research.</p> <p>-Differences from the current research: this research applies a longitudinal research design, while the current research applies a cross-sectional design.</p>			
(Wang, J. et al., 2012)	-Examines how loneliness influences consumers' reactions to consensus-related social cues in marketing contexts.	<p>-IV (lonelier vs conformer)</p> <p>-DV (minority-endorsed products vs majority-endorsed products)</p> <p>-MV (fitting the loneliness feelings)</p> <p>-ZV (private vs public context)</p>	-Two experiments on 120 and 126 undergraduate students.	<p>-Lonely consumers tend to favour products endorsed by minorities, while non-lonely consumers prefer products endorsed by majorities. This preference pattern holds true only when consumers' product choices are kept private. However, when these preferences are exposed to public scrutiny, lonely consumers shift their preferences towards majority-endorsed products. Minority-endorsed products resonate more with the feelings of loneliness, and this alignment mediates the impact of loneliness and endorsement type (i.e., majority vs. Minority) on product evaluations in private settings. In contrast, when their preferences are publicly visible, lonely consumers, concerned about negative evaluation by others, conform to majority endorsements.</p>
	-Similarity/benefits to the current research: this research guides the current research in studying the effect of loneliness on private vs public context, as daily routine vs Ramadan banquets, highlighting the importance of studying the public context of lonelier.			

Article details	Aim and objectives	Theory and variables*	Methodology	Results
Citation				
	-Differences from the current research: this research applied two experiments on undergraduate students, while the current research applied 3 studies in a more descriptive way, rather than causality approach.			
(Masi et al., 2011)	-Provides the rigour demanded by previous reviews and quantifies the effectiveness of primary intervention strategies for reducing feelings of loneliness.	-Individual differences model	-A total of 50 studies ultimately qualified for meta-analysis.	-The type of intervention did not vary across study designs; each strategy was implemented across various study designs, including single-group pre-post evaluations, nonrandomised group comparisons, and randomised group comparisons. Interventions targeting maladaptive social cognition showed a larger mean effect size compared to those addressing social support, social skills, and opportunities for social interaction.
	-Similarity/benefits to the current research: the current research benefited from the individual differences model in developing the control variables. In addition, the current research focuses on studying the conflict between social identity theory and responsible consumption stems from using social skills and social interaction to reduce loneliness.			
	-Differences from the current research: this research is based on the individual differences model, while the current research is grounded on social identity theory. This research is a meta-analysis of the literature, while the current research is empirical research with primary data collection from field studies.			
(Pettigrew, 2007)	-Examines the experiences of loneliness among older individuals and how these experiences might be alleviated through consumption practices.	-Feeling of loneliness coping strategies.	-Interviews were conducted with 19 Australians aged 65 years and older.	-A variety of coping strategies were reported to mitigate distressing levels of loneliness. These included maintaining regular contact with close individuals, engaging in extensive reading, and actively participating in gardening and shopping. Several potential consumption-related strategies to alleviate loneliness are suggested, such as using consumption rituals to structure social interactions and promoting activities like reading and gardening.
	-Similarity/benefits to the current research: this research guides the current research in using banquets as venues to restructure social interaction when feeling loneliness.			

Article details				
Citation	Aim and objectives	Theory and variables*	Methodology	Results
	-Differences from the current research: this research is applied to Australian-aged people, while the current research is applied to wider age groups from Muslim-dominated communities.			
(Kim, Youn-Kyung et al., 2005)	-Extended to various shopping motivations that are presumably linked to the consumption of experiences.	-IV (family interaction/ social interaction) -MV (loneliness/consumption-oriented mall shopping motivation/ experiential mall shopping motivation) -DV (mall spending)	-419 mall-intercept interviews with people who are 55 or older in large malls in three metropolitan cities in the United States.	Social interaction, loneliness, and mall-shopping motivations significantly impact mall spending. A mall can serve as a venue for alleviating loneliness among older consumers, and retailers can attract these consumers and encourage higher spending by emphasising value and service consumption.
	Similarity/benefits to the current research: this research guided the current research by studying the social interaction with loneliness. For instance, the loneliness can be reduced with Ramadan banquets.			
	Differences from the current research: this research is applied to aged people in the US, while the current research is applied to wider age groups from Muslim-dominated communities.			
(Kupersmidt et al., 1999)	-Examines Higgins's (1987) self-discrepancy model as a framework for understanding loneliness in adolescents.	-Social self-discrepancy theory.	-Surveying 212 African American and Caucasian 7th - and 11th-grade students enrolled in a rural southern public high school.	-For each of the universal social needs or ideals, there were significant correlations between the actual social self and loneliness.
	-Similarity/benefits to the current research: this research is grounded on the self-discrepancy theory, which explains the conflict between sexual identity-related factors and the reproductive consumption behaviour of food.			
	-Differences from the current research: this research is applied to young people in high school, while the current research is applied to wider age groups from Muslim-dominated communities.			

* IV (Independent variable), DV (Dependent variable), ZV (Moderator variable), and MV (Mediator variable)

2.6.1 Consequences of loneliness feeling

COVID-19 pandemic and its related distress have a significant effect on consumer loneliness, which in turn significantly affects his/her mental health (Werner et al., 2021). For example, lonely people suffer from cognitive decline and the progression of Alzheimer's. Such a relationship can be explained by the feeling of isolation and disconnected from others which increases the possibility of vascular resistance (Cacioppo et al., 2002), and harmful clinical disorders (Masi et al., 2011). This led the World Health Organization (WHO) to consider social isolation as a major public health issue. Accordingly, the UK and Japan created loneliness ministries in 2018 and 2021 respectively (Fontanari, 2021).

The deep feeling of loneliness induces psychological and physical outcomes (Rippé et al., 2018; Sams et al., 2021). Among these undesired concerns, actual and perceived illness, depression, personality disorder, and intention to suicide (Pettigrew, 2007). This feeling induces lonelier to pay more attention to social cues than normal ones (Wang, J. et al., 2012). In addition, lonely-feeling people are more anxious, angry, in bad moods, pessimistic, and fearful of negative evaluations by others. As a result, loneliness can affect the consumer's personality rating and socioemotional states (Cacioppo et al., 2006). For instance, lonelier people prefer minority-endorsed products when they buy them privately, but they prefer majority-endorsed products when they are under public scrutiny (Wang, J. et al., 2012) (e.g., public banquets). Similarly, they prefer brands that provide a sense of companionship (i.e., anthropomorphized brands) than objective-like brands (Meyer et al., 2024).

Moreover, feeling lonely increases the perception of shopping motivations such as diversions, aesthetic appreciation, and, most importantly, eating (Kim, Youn-Kyung et al., 2005). The latter motivation can increase unplanned purchasing behaviour, materialistic values, social needs, or unhealthy eating behaviour which are reflected in the food waste increase.

2.6.2 Definition of loneliness

Well-established research varies in defining loneliness. Psychologically, it is “an experienced discrepancy between the kinds of interpersonal relationships the individuals perceive themselves as having and the kind of relationships they

would like to have” (Sermat, 1978) in Kim, Youn-Kyung et al., (2005). This definition is supported by other researchers as they defined it as “the discrepancy between a person’s desired and actual social relationships” (Russell et al., 1980; Peplau & Perlman, 1982; Masi et al., 2011; Loh et al., 2021), and “discrepancy between what one wants from interpersonal affection and intimacy, and what one gets; the greater the discrepancy, the greater the loneliness” (de Jong-Gierveld, 1989; Rippé et al., 2018)

Subsequently, from a biological perspective, loneliness feeling is “a state that has evolved as a signal to change behaviour—very much like hunger, thirst, or physical pain—that serves to help one avoid damage and promote the transmission of genes to the gene pool (Cacioppo et al., 2002; Masi et al., 2011). Similarly, it is “a subjective state marked by the unpleasant experience that occurs when a person’s network of social relationships is deficient in some important way, either quantitatively or qualitatively.” (Perlman & Peplau, 1981; Rippé et al., 2018). It is worth noting that the common and persistent feeling of loneliness is the aversive mood that stems from the isolation from others (Pieters, 2013).

Indeed, loneliness state is a subjective issue that originates from the need for social connectedness and belonging (Rippé et al., 2018). It is related to the one’s feelings in the group. No matter this group members number, the most significant factor is the interactions between those members (Wang, J. et al., 2012). More specifically, people need to socialize with others who only value, trust, and care about them and their offspring (Masi et al., 2011). In this regard, some people enjoy their solitude as they are alone but not loneliness. While others feel loneliness when contacting people that emotionally disconnected (Burger, 1995)in (Wang, J. et al., 2012). Hence, the *quality, not the quantity matters* (Wang, J. et al., 2012).

2.6.3 Attributes of loneliness

Various signs can lead to identify lonely people. They tend to have fewer gatherings in terms of people and repetitions, which increases their social isolation (Rippé et al., 2018). However, they have more desire for social belongness and have more social anxiety, which enhances their memory about

social cues, but their attempts to support their social network are very limited (Wang, J. et al., 2012). In other words, the lonely person knows their psychological needs from the social out-group, but they do not persist in changing themselves to be in-group. Moreover, they prefer to spend more time alone as they lack social interaction skills. They infer the social cues from the facial expressions more than others. They are less cooperative, more aggressive and defensive. They feel negative and negatively evaluated by others (Wang, J. et al., 2012).

In addition, studying the loneliness syndrome as a chronic disease that stems from its complicated progression process. Since lonely people are more shy and anxious, have less social interaction skills, less self-esteem, and lack social support (Cacioppo et al., 2006), they like to communicate with other lonely people. Hence, the increase of the loneliness severity degree. The geographical spread of such a phenomenon increases the possibility of a growing number of lonely people over time. Moreover, lonely people are more dangerous as they can increase negative thinking not only from other lonely people but also by eliciting it from healthy, positive-thinking people. Such behaviour maintains the formation loop unbreakable. This, in fact, explains the increased feeling when they interact with healthy ones (Masi et al., 2011).

Moreover, complementary to the previous research (Grau et al., 2019), the COVID-19 pandemic increased the individual need for socialization that could be met virtually through social media platforms. Such relationships can decrease the feeling of isolation and loneliness. However, until certain point, the overuse of social media increases the negative consequences, such as problematic sleep (Dhir et al., 2021) loneliness risk (Masi et al., 2011). Therefore, a U-shaped curve could represent the relationship between social media use and loneliness. While moderate social media use can decrease feelings of loneliness, excessive use can increase loneliness by decreasing enjoyment and satisfaction, as in Figure 2–5.

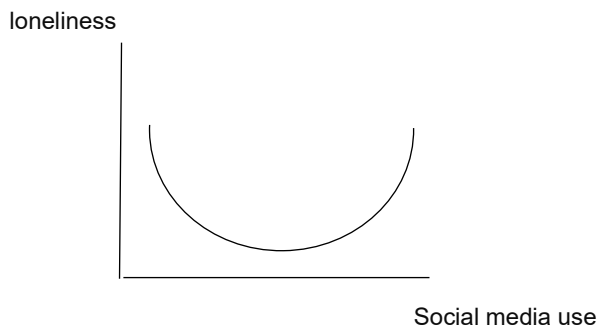


Figure 2–5, U shape of social media use and loneliness.

Furthermore, the loneliness phenomenon can be an undesired passing mood for some consumers, but for others, it may be considered as chronic bad experience. Some lonely people can understand their unstable mental state, but others cannot. Hence, the loneliness can be heritable or environmental (Masi et al., 2011).

2.6.4 Loneliness, isolation, depression

Moreover, it is important to discriminate loneliness from related similar constructs such as social isolation and depression. Although loneliness and social isolation are related, they are distinct constructs. While the loneliness state refers to the perceived social disconnectedness from a subjective perspective, the social isolation objectively measures the social relationships. In other words, loneliness interested in relationship quality, but social isolation focuses on the relationship's quantity (Masi et al., 2011).

Likewise, another common related construct to loneliness is depression. However, the two concepts are distinct. While the loneliness state refers to the signals that are sent from the lonelier consciousness to escape from the undesired situation, depression prevents physical attempts to do so (Wang, J. et al., 2012). In addition, the discriminant validity between loneliness and depression has been established in the previous research (Cacioppo et al., 2006; Wang, J. et al., 2012). (Cacioppo et al., 2006; Wang, J. et al., 2012).

2.6.5 Loneliness-related theories

The loneliness feeling is indeed related to the relational theory, social discrepancy theory, and social identity theory. While the relational theory posits that the individual is part of the relationship network. Hence, s/he constantly needs to create and sustain these relationships (Rippé et al., 2018). Such bi-directional relationships are maintained due to the mutual recognition/respect of all parties. However, the lonelier suffers from expecting others' negative thoughts about him/her. Such psychological threat is held when the lonelier personality does not match the group. Congruently, the self-discrepancy theory argues that this undesired inner risk activates the self-discrepancy that increases the feeling of loneliness (Loh et al., 2021).

Nonetheless, progressing feelings of loneliness due to the self-discrepancy that originates from the "illusion" of others' negative evaluation thoughts increases the likelihood of being out of the group. According to the social identity theory, people affiliate with the social group that matches their values, emotions, and norms. This social group is identified as "in-group" or "us", which gives a sense of social identity. Nevertheless, a person usually classifies others' membership into in-group (us) and out-group (them) based on the perceived similarities and differences (Agarwala et al., 2019). However, as for the lonelier, the cognition process that classifies people is more defensive and aggressive. Hence, lonely people tend to classify normal people who may share some interests with them as out-group. In addition, lonely people sometimes withdraw themselves from their in-group friends/relatives and consider them as out-group, which increases their isolation and loneliness.

Notwithstanding, the increase of loneliness increases the need for socialization that can be easily met by social media platforms. Such social media platforms offer a lower severity degree of negative outcomes due to the lonelier withdrawal from his in-group. This complicated behaviour supports the difficulty of withdrawing from social media addiction, which keeps the loop of the social media addiction-loneliness iterative pattern.

2.6.6 Loneliness types

Feeling loneliness has been categorized into two types: social loneliness and emotional loneliness (Weiss, 1973). Social loneliness stems from the lack of larger social networks that can provide a sense of belonging to the social world, possibly because of life events such as death or divorce. Yet, emotional loneliness is experienced when loss of intimate connectedness with others such as loved people, family members, or friends (Rippé et al., 2018; Loh et al., 2021). Weiss (1973) claims the separation between the two types. This separation is statistically confirmed by factor analysis in various studies, as mentioned in a quantitative meta-analytic review (Masi et al., 2011). Therefore, scholars analysed them separately (Rippé et al., 2018; Jang & Arens, 2023). Recent research incorporates only emotional loneliness in building a brand relationship with the customer (Loh et al., 2021). Yet, besides the high correlation between the loneliness dimensions, the overlap between their drivers and outcomes is reported. Accordingly, scholars suggest the unidimensional perspective in studying the loneliness (Masi et al., 2011) and test it in the endorsed product buying behaviour (Wang, J. et al., 2012). Hence, the current research depends on using both dimensions instead of pooling them in measuring loneliness, as people during the pandemic time might suffered differently from both dimensions of loneliness distress.

To this end, measuring the loneliness state has been reported in the meta-analysis studies, and more than 10 measures have been reported (Masi et al., 2011). However, only two measures were reported as well-established universal measures: the University of California at Los Angeles (UCLA) and the De Jong Gierveld scales. Accordingly, recent research utilized the UCLA measurement (Cacioppo et al., 2002; Wang, J. et al., 2012; van den Eijnden, Regina J. J. M. et al., 2016; Bertram et al., 2021; Loh et al., 2021; Sams et al., 2021; Jang & Arens, 2023). Likewise, the De Jong Gierveld measurement has also been incorporated in recent research (Kim, Youn-Kyung et al., 2005; Rippé et al., 2018; Brouzos et al., 2021; Altinay et al., 2023). The former scale, “UCLA”, shows a higher degree of reducing loneliness (Masi et al., 2011). However, UCLA supports the argument of the one-dimensional loneliness scale. In addition, UCLA is recommended to be summated before being included in the research, which renders the factor analysis assessment. In addition, the positive-worded items should be reversed

before the composing process as the higher negative scores reflect the higher loneliness. However, the De Jong Gierveld implies both a two-dimensional option and pooled items in one dimension, depending on the research question. Hence, the current research adopts the short version of the De Jong Gierveld scale (de Jong-Gierveld, 1989) as mentioned in Rippé et al., (2018).

2.6.7 Loneliness predictors

Feeling loneliness is developed 50% heritable and 50% environmental (Masi et al., 2011). Several reasons are investigated to trigger the loneliness feeling. To elaborate, socioeconomic, gender, age, daily competence, delayed marriage, and single-residence households are considered to increase the loneliness prevalence (Kim, Youn-Kyung et al., 2005; Masi et al., 2011; Sams et al., 2021). Moreover, the lack of perceived attachment, lack of social support, low self-esteem, moving to a new city, and losing a friend or loved one are reported as the main predictors of loneliness (Masi et al., 2011; Wang, J. et al., 2012; Loh et al., 2021). Notably, the most significant reported driver of loneliness is the increased disconnectedness from family and social groups (Kim, Youn-Kyung et al., 2005). Such predictors can be classified as emotional, behavioural, and social (Kupersmidt et al., 1999) as in figure 2–6.

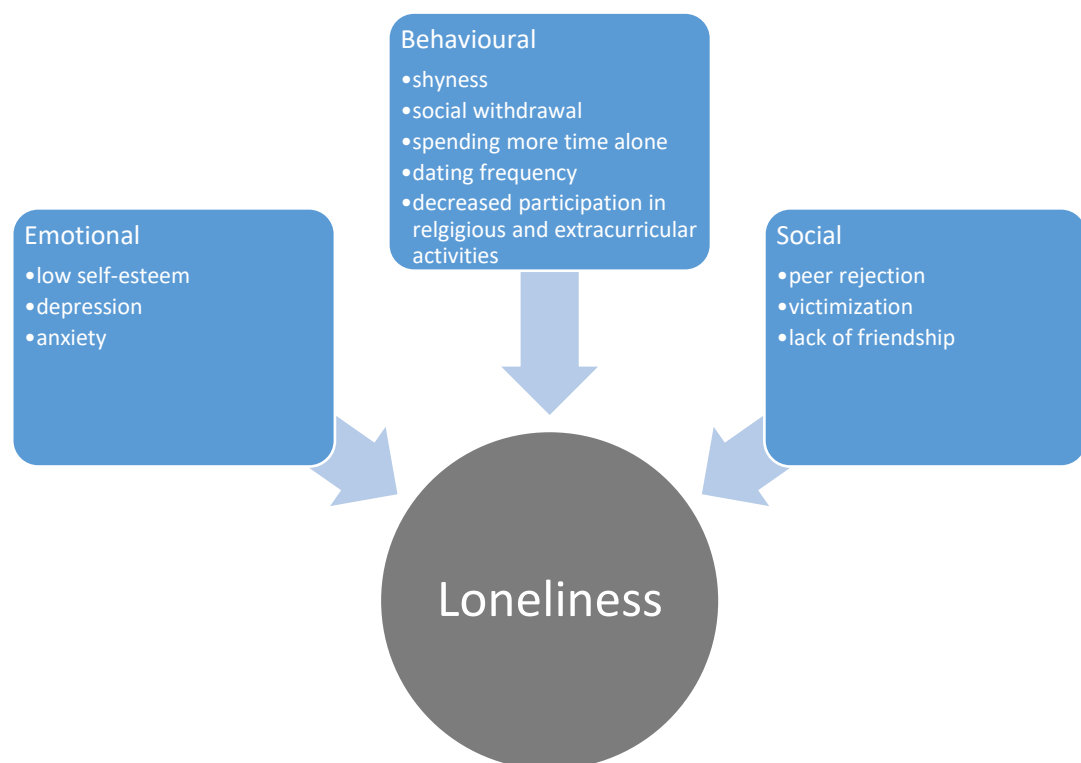


Figure 2–6, Loneliness predictors

Moreover, the interrelationships isolation has triangular forms: the quantity, quality, and source. With respect to quantity, less frequent relationships increase loneliness (more specifically, social loneliness). In addition, the relationship quality reflects various desired feelings of satisfaction, love, and understanding, which have negative effects on loneliness (emotional state). Finally, the relationship source refers to the family, friends, neighbours, and children. The latter is preferred by older people than others.

2.6.8 Loneliness reduction interventions

Recent research suggested that loneliness is not an immutable attribute. Instead, it can be mitigated. The rise of loneliness and chronic distress has been partially reduced by some of the significant effective interventions. These interventions are categorized into four categories according to their objectives: a) improving social skills, b) enhancing social support, c) increasing opportunities for social contact, and d) addressing maladaptive social cognition (Masi et al., 2011). On the one hand, increasing the opportunities for social contact true faces social loneliness (Quantity, not quality). On the other hand, the maladaptive social cognition strategies focus on fixing the social interaction (quality). Accordingly, lonelier thinks his need to socialize through increasing the number of network members indeed increases social isolation instead of alleviating it. This may lead to materialism and compensating behaviour (Loh et al., 2021).

Some self-regulatory strategies are supported to reduce loneliness seriousness such as shopping (Kim, Youn-Kyung et al., 2005; Pettigrew, 2007; Wang, J. et al., 2012; Rippé et al., 2018), mindfulness and positive psychology exercises (Brouzos et al., 2021), self-brand connectedness, and compensatory consumption (Loh et al., 2021), Group treatment (Marmarosh et al., 2020), women's self-compassion treatment (Farzanfar et al., 2020), extensive reading, gardening (Pettigrew, 2007), and hospitableness (Altinay et al., 2023), and eating (Kim, Youn-Kyung et al., 2005; Pettigrew, 2007).

Recently, within pandemic restrictions, loneliness feeling people can mitigate their loneliness through the online use of traditional remedies. As such, online psychology exercises (Brouzos et al., 2021), Shopping closer to home (convenience stores), then online stores, then supermarkets (Minawi et al., 2020).

Hence, the use of the internet and social media can be utilized in searching for a solution to mitigate the loneliness state. This supports the excessive use of social media, which, in turn, leads to an increase in loneliness instead of mitigating it, especially within a high uncertainty degree of the possible mutations of the virus.

2.6.9 Loneliness in the COVID-19 pandemic – gender differences

It is of interest to report the main attributes of loneliness in individuals. Due to the COVID-19 pandemic, google trends reflected substantial damage to well-being in societies by searching for boredom, loneliness, worry, and stress. This severely affected the individuals' mental health during the pandemic (Brodeur et al., 2021). Mostly, older people are more vulnerable to chronic distress of loneliness as they have few options to relieve it (Kim, Youn-Kyung et al., 2005; Pettigrew, 2007). Such a claim is supported by the meta-analysis review (Masi et al., 2011), as well as with the current COVID-19 pandemic related literature (Bertram et al., 2021; Sams et al., 2021).

Remarkably, in middle-aged and older people, females are more susceptible to loneliness than males. In this regard, in a self-report study, women felt more lonelier than men. This is because women usually build fewer nonfamily social groups (internal world) due to their role in the household, while men have more chances (external world) to increase their social networks due to their jobs (Kim, Youn-Kyung et al., 2005). Similarly, in a more conservative society, Malaysian women feel lonelier than men due to their multi-faceted roles as wives, mothers, and housekeepers. Therefore, she spends more time in the house, which increases her possibility of feeling lonely. On the other hand, men in the same conservative environment can socialize with friends and colleagues (Loh et al., 2021). One more hidden driver of loneliness in Islam is the fear of polygamy, as men can marry 4 women, even if it is not the normative standard, but women cannot marry more than one man at one time. Accordingly, it is not that strange to find women are more resistant than men to rescue themselves from the loneliness state as she is more self-reliant (Masi et al., 2011; Werner et al., 2021).

In addition, job status affects the formation of the loneliness loop. Since housewives have sufficient time to think and feel isolated, they develop the loneliness loop in their own way (Masi et al., 2011), especially among elders

(Klein, 2020; Han et al., 2021; Müller et al., 2021). Interestingly, a working female also suffers from feelings of loneliness during her job due to various stressors (i.e., less frequent telecommuting, job insecurity, and lack of information in work performance) (Andel et al., 2021), especially with “working from home” policies as many businesses closed or shifted to online formats (Roggeveen & Sethuraman, 2020). Such social disconnection increases the depression, anxiety, and fear levels which keep her in the loneliness loop in the out-of-work hours (Werner et al., 2021).

Accordingly, the mature woman in the Muslim family is more representative of the household responsibility. Also, the mother/wife knows her family needs socialization more than the busy father/husband. Such needs can be lessened by compensating behaviour such as Banquets in Ramadan which is the context of this study. In addition, considering the pressure she suffers and the time she has during Ramadan, she is more vulnerable to feeling lonely. Hence, she may resort to compensatory consumption to relieve her undesired emotions (Loh et al., 2021). Yet, within the pandemic Timed Intervening Policies (TIP) (Prentice et al., 2020), she can use the social media for socializing and other reasons to mitigate her bad feeling as a last resort.

2.6.10 Self-discrepancy and loneliness feeling

Loneliness feeling can be characterized by two theoretical models: the social need model and the cognitive discrepancy model. From the social need model, individual universal and basic needs include the need for social contact (e.g., affiliation and intimacy). When this need cannot be met, the person develops the feeling of loneliness (Kupersmidt et al., 1999). However, the theory of self-discrepancy that is intensively grounded in social psychology explains that loneliness increases when the discrepancy between three domains: actual vs. ideal, or actual vs. ought selves exists (Higgins, 1987). The attributes the individual believes s/he possesses, would ideally like to possess, or ought to possess reflect the actual, ideal, and ought self-domains (Pentina et al., 2009).

From the self-discrepancy theory lens, social isolation is not essential; the only matter is the match/mismatch between the person's actual self and other types of (ideal or ought) self-guides. (Higgins, 1987). Hence, a stronger feeling of

loneliness occurs when the larger discrepancy between one's actual interpersonal contact falls short of the desired ideal degree of contact (Higgins, 1987; Kupersmidt et al., 1999). Moreover, self-discrepancy depends on intelligence level, power sense, and social group belongingness (Mandel et al., 2017).

Within the Industrial Revolution, the main sociological challenges derived from loneliness were reported as the decline in primary group interactions and family mobility reduced communications within larger kinship groups. In this regard, the lonelier attempts to build relationships to exchange the perceived images to others. In such a relationship, presenting an external image to others that is different from internal feelings increases the feeling of loneliness instead of overcoming it. Therefore, the discrepancy between self-image (internal feeling) and perceived image from others causes loneliness, especially among females (Moore, 1976).

2.6.11 Loneliness and the holy month of Ramadan

The feeling of loneliness in the holy month of Ramadan can be induced by three main drivers, namely, time to think/feel isolated, media/social media, and self-discrepancy. Considering the holy month of Ramadan, Muslims believe that this 30-day season is a gift from their lord to fix broken feelings, enrich low morals, and tighten their relationship with their god by strictly following Islamic teachings. Islamic institutions (i.e., Al-Azhar Al-Sharif), and Muslim scholars keep posting to remind Muslims how they can benefit from the holy month of Ramadan (e.g., Glorious Qur'anic interpretation) (Maigari et al., 2020). Among these reminders are to tighten the relationship with the parents and relatives (extended family) as Muslims suffer from being socially disconnected in the other 11 months of the year due to the work-life imbalance. Such isolation feeling is enlarged at the beginning of Ramadan when Muslims must change their daily routine to be able to fast about 14 hours, on average, which gives them time to think and feel isolated (Odabasi & Argan, 2009), especially when they spend too much time on social media than the usual non-Ramadan times (AlShehhi et al., 2019). More specifically, the two Ramadan months of 2020 and 2021 witnessed the peak of the COVID-19 pandemic in various countries without vaccination programs.

Therefore, various Islamic mission organizations keep reminding people about the good deeds of re-establishing the damaged relationships. As prophet Mohamed (PBUH) said, *“He who desires ample provisions and his life be prolonged, should maintain good ties with his blood relations”*. Similarly, the prophet Mohamed (PBUH) warns those who disengage from their blood relations as he said, *“The one who severs the ties of kinship will not enter Paradise”*. Also, one day Muslim prophet (PBUH) said, *“Shall I not inform you of something more excellent in degree than fasting, prayer and almsgiving (Sadaqah)? The people replied: Yes, Prophet of Allah! He said: It is putting things right between people; spoiling them is the shaver (destructive)”*.

Hence, he (PBUH) clarified that those who suffered from relations' isolation to take the initiation instead of waiting for others and accepting their invitation as he said, *“The person who perfectly maintains the ties of kinship is not the one who does it because he gets recompensed by his relatives (for being kind and good to them), but the one who truly maintains the bonds of kinship is the one who persists in doing so even though the latter has severed the ties of kinship with him”*. A higher level of the encouragement includes *“Giving charity to a poor person is charity, and (giving) to a relative is two things, charity and upholding the ties of kinship”*, the prophet (PBUH) said. All these Islamic teachings encourage Muslims to tighten their relationship, which keeps them away from isolation and increases their social solidarity (i.e., the value of the spirit together, collective consciousness, and cooperation) (Shalihin et al., 2020).

Moreover, the Islamic teachings encourage Muslims to be generous enough to feed the fasting persons; as prophet Mohamed (PBUH) said, *“Whoever gives food for a fasting person to break his fast, he will have a reward like theirs, without that detracting from their reward in the slightest”* (Sunnah, Sunan Ibn Majah 1746). In addition, the perceived philanthropic values during Ramadan are reported as high, which helps in overcoming poverty in the Muslim community during Ramadan (Shalihin et al., 2020). Jointly together, Muslims prefer to take the good deeds of providing the food to their fasting relatives. Hence, they conduct a lot of banquets in the holy month. Such hospitableness tradition has been proven to reduce the feeling of loneliness (Altinay et al., 2023), which was highly promoted in media during Ramadan. Therefore, Ramadan banquets serve

as a practical expression of generosity and worship during this sacred time, in the current research.

In addition, the advertisements campaigns regularly in the holy month of Ramadan target the family orientation: *“A common approach, not limited to ads for food products, is to show families at their evening iftar. One Coca-Cola spot that aired every night of Ramadan features a father with his young son strolling through a carnival setting surrounded by Ramadan lanterns and discussing the joys and meaning of Ramadan”* (Keenan & Yeni, 2003). Similarly, Abdul Latif Jameel Motors (Toyota sector) initiated a campaign to celebrate the time of family gatherings in Ramadan (Serviceplan Group, 2022). Although this seems to encourage social connection, it may deepen the pain of isolation for those who suffer from it. Like the advertisements of the delicious foods that hurt the fasting people. In the same vein, the recent COVID-19 restrictions of the “quarantine”, “social distance”, “face covering”, “keep 2m distance”, “stay home-stay safe” and “no shake hands” extended the loneliness pain, especially in the holy month of Ramadan. For instance, elders suffered from being weak, and isolated and feared a positive result of the COVID-19 self-test. The fear of a positive result of the COVID-19 test led to intensifying depression and anxiety feelings as people knew there was no medicine. Therefore, people might avoid other’ contact when there is a need to tighten their social bonds during these hard times (Han et al., 2021).

Beside the abovementioned discussion, Muslims in Ramadan have some unique traditions. While Muslims Ramadan fast for long hours (on average 14 hours per day) for 30 continuous days, they sometimes use social media platforms for many reasons: to pass time, socialize, fear loneliness, watch cooking videos, and/or recognize the reviewer's feedback on the various products or TV series. Also, governments decrease the work hours during Ramadan in Muslim countries, which increases the free time for employees to entertain. In this regard, on a long hour fasting day, people need to pass the time to mitigate their hunger feeling, especially during the first days of the holy month of Ramadan. In fact, passing the time and procrastination while studying have been reported by students (Grau et al., 2019). Similarly, passing the time while fasting and preparing the food for the breakfast meal can exist among Muslims.

In a related vein, while a wife in a Muslim household is almost responsible for the cooking and other non-financial household responsibilities, she is professional in preparing food. Her excellency in preparing food gives her plenty of free time during fasting. Such time is needed to be spent in order to overcome the feeling of hunger. Hence, watching TV and social media use show up. In a more detailed perspective, the telecommunication companies increase their internet bundle offers in the holy month to keep the customers more loyal. Such offers are consumed on social media. In addition, the advertising campaigns during Ramadan in Muslim countries focus on Socializing needs, and Muslims should rebuild their relationships with others during this month. Accordingly, time passing needs, socializing needs, availability of the internet, accessibility of smartphones, and very interesting diverse content on social media platforms could be the perfect recipe for obsessing the social media browsing during Ramadan among Muslim women, which increases the feeling of loneliness.

Finally, the loneliness feeling can be derived from the discrepancy between actual and ideal selves since the aim of fasting during the holy month of Ramadan is to appreciate God's gifts by avoiding them at a specific time, from Dawn time until sunset. Table 2-6 presents the actual vs ideal self-discrepancies during the holy month of Ramadan, covering various domains such as inviting extended family to the banquet, feeding the needy, feeding those who are fasting, honouring guests, eating behaviour, smoking behaviour, and the treatment of non-practising believers. Such domains can be clearly reflected in on Ramdan banquet. Therefore, the three stimuli of loneliness can be boosted during the holy month of Ramadan, within COVID-19 times, resulting in the regulatory or compensation behaviour.

Table 2-6, Self-discrepancies in the holy month of Ramadan

Discrepancy domain	Actual self	Ideal self
Inviting extended family to the Banquets.	Feel isolated, directly before Ramadan, especially from the extended family.	Muslim Prophet (PBUH) encouraged Muslims to “ <i>O people, exchange greetings of peace (i.e., say: As-Salamu 'Alaikum to one another), feed people, strengthen the ties of kinship, and be in prayer when others are asleep, you will enter Jannah in peace</i> ”(Sunnah, Riyad as-Salihin 848)
Feeding needy people	<p>Needy people feel depressed from poverty, especially if they are fasting.</p> <p>Rich people feel empathetic to those who are in need.</p> <p>Rich people feel they can donate food to needy people but prefer social banquets over Ramadan.</p> <p>Rich people feel unsafe when they see miserable, poor ones.</p>	<p>For rich people, the Holy Qur'an commands the Muslims and their prophet Mohamed (PBUH), “<i>And as for the petitioner, do not repel [him]</i>” (Qur'an 93, 10).</p> <p>Also, the Holy Qur'an describes the Muslims as “<i>And in their wealth and belongings was a rightful share for those who asked (for help) and for those who could not</i>” (Qur'an 51, 19).</p> <p>Also, the Holy Qur'an asks Muslims and their prophet to clean their money using obligatory and philanthropic donations “<i>[Take, [O, Muhammad], from their wealth a charity by which you purify them and cause them increase ...]</i>” (Qur'an 9, 103).</p> <p>Also, the Muslim prophet (PBUP) motivated Muslims to donate as he said, “<i>[Wealth does not diminish by giving Sadaqah (charity)....]</i>” (Sunnah, Riyad as-Salihin 602)</p>
Feeding fasting people	<p>Feeding in banquets or public banquets may formulate signals to others as donors (Ahmed Emam, 2022).</p> <p>Feeding the extended family in banquets to socialise.</p> <p>Feeding fasting people with only dates not whole meals.</p>	<p>As a role model, Muslims follow their prophet (PBUP) as it was reported from him, “<i>Allah's Messenger (PBUH) was the most generous of people in charity, but he was generous to the utmost in the month of Ramadan. ... was most generous in giving charity like the blowing wind</i>” (Sunnah, Sahih al-Bukhari 3554).</p> <p>Also, a Muslim prophet said, “<i>Whoever gives food for a fasting person to break his fast, he will have a reward like theirs, without that detracting from their reward in the slightest.</i>” (Sunnah, Sunan Ibn Majah 1746).</p> <p>He also prayed to those who invite fasting people to their dining fasting break table “The prophet (PBUH) came to visit Sa'd bin 'Ubadah (May Allah be pleased with him) who presented bread and olive oil to him. The prophet (PBUH) ate it and said, “<i>The observers of fast have broken their fast with you (this is the literal translation, but the meaning is: 'May Allah reward you for providing a fasting people with food to break their fast'); the pious people have eaten your food, and the angels invoked blessings on you</i>” (Sunnah, Riyad as-Salihin 1267).</p>

Discrepancy domain	Actual self	Ideal self
Honouring guests	Entertaining our guests by banquets excessive food, so they cannot leave us hungry.	Muslim prophet (PBUH) said, " <i>Whoever believes in Allah and the Last Day, should not hurt his neighbour and whoever believes in Allah and the Last Day, should serve his guest generously and whoever believes in Allah and the Last Day, should speak what is good or keep silent</i> " (Sunnah, Sahih al-Bukhari 6136). And said, " <i>No one of you shall become a true believer until he desires for his brother what he desires for himself</i> " (Sunnah, Riyad as-Salihin 236)
Eating behaviour	In the pre-fast meal, eat as much as you can as you will fast for a very long time. At the breakfast meal, eat all you want as you are so hungry. Then, eat as much as you can at the pre-fast meal again.	The prophet (PBUH) said, " <i>A human being fills no worse vessel than his stomach. It is sufficient for a human being to eat a few mouthfuls to keep his spine straight. But if he must (fill it), then one third of food, one third for drink and one third for air.</i> " (Sunnah, Sunan Ibn Majah 3349)
Smoking	Smokers must not smoke during the fasting time as it invalidates their fasting worship.	Smokers should stop smoking all the time as it causes bad deeds.
Non-Prayer believers	I can fast but not pray the 5 daily prayers, as this cannot invalidate my fasting worship.	Prayer is more important than fasting as it is the second pillar of the 5-pillars of Islam.

Chapter summary:

The second chapter offered a comprehensive review of the theoretical underpinnings of the study variables: food waste behaviour, consumer religiosity, materialistic values, and the feeling of loneliness. It included definitions, dimensions, related concepts, main drivers, and outcomes to establish a clear theoretical positioning for each concept within contemporary marketing research. Building upon this foundation, Chapter Three will focus on constructing the relationships between these study variables within the research model.

Chapter 3 Conceptualisation of food waste and religiosity

“Children of Adam! Take your adornment at every time of Prayer; and eat and drink without going to excesses. For Allah does not like those who go to excess.”

(Qur'an 7:31)

3.1 Introduction

The ongoing chapter illustrates the structural relationship between the study variables to build the conceptual model, as in figure 3–1. First, it shows the literature review, which illustrates the relationship between religious commitment and food waste behaviour. Then, it shows the relationship between religious commitment and materialistic values. After that, it discusses materialism with food waste behaviour. This introduces the indirect relationship between religious commitment and food waste behaviour through individual materialism. Moreover, it explains the relationship between loneliness and materialism and food waste behaviour. This leads to the study of the indirect relationship between loneliness and food waste behaviour via materialistic values.

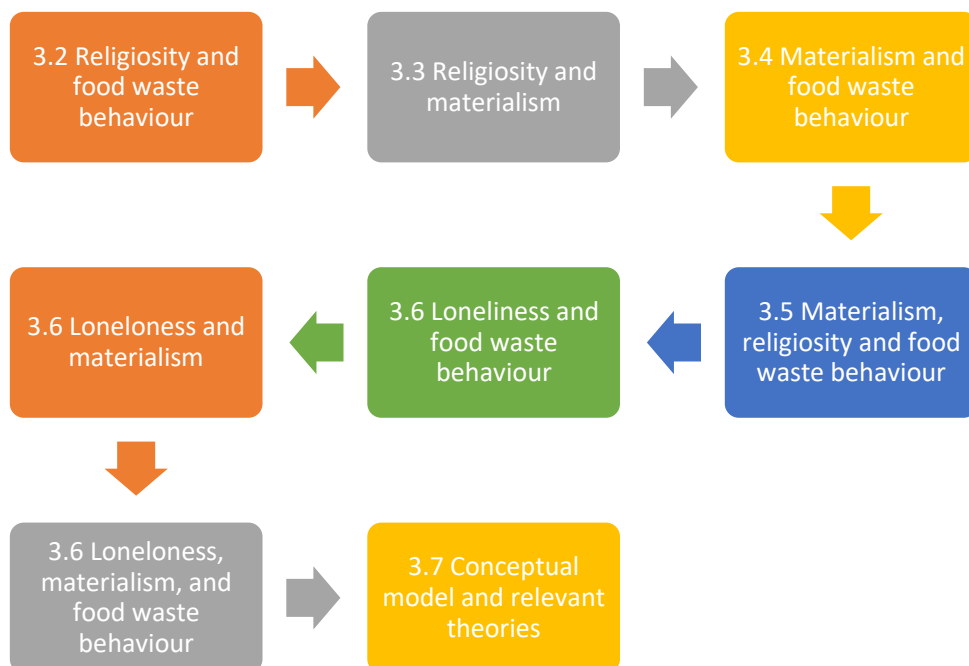


Figure 3–1, Conceptual model chapter map

3.2 Religiosity and food waste behaviour

The direct and indirect relationship between religious commitment and food waste behaviour is first introduced by the religiosity and sustainability issues as follows:

3.2.1 The relationship between religiosity and sustainability

People across the world show their concerns about various sustainability issues that range from climate change to pesticide use in agricultural industries. Therefore, psychologists recently focused on studying the effect of demographic traits on raising general sustainability awareness (Minton et al., 2015). Among these traits is the religious personality.

Following the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), the religiosity can motivate the sustainable behaviour (Mimiaga et al., 2009). In this regard, religious beliefs increase religious people's intentions to participate in sustainable practices such as buying green cleaning supplies, organic food, and recycling behaviours. This result holds in both Buddhists and Christians in the US and South Korea (Minton et al., 2015). Among these sustainable practices are eco-centric and pro-environmental behaviours.

With regards to the eco-centric and environmental attitude, the eco-centric attitude refers to the belief that the precarious nature of the environment needs human intervening to sustain it (Martin & Bateman, 2014). Accordingly, the eco-centric attitude leads to the pro-environmental practices (Rice, 2006). Such practices differ from one scholar to another. Figure 3–2 shows two types of pro-environmental behaviours.

Public sphere behavior	Activist behavior	Private sphere behavior	Environmental behaviours (Martin & Bateman, 2014)
<ul style="list-style-type: none"> •Not smoking in public •Talk often with my friends about ways to deal with environmental pollution •Teach children the value of cleanliness •Discuss environmental problems with work or school colleagues •Consciously try to reduce my driving 	<ul style="list-style-type: none"> •Attend meeting of a local citizens' environmental committee •Attend workshops/seminars about environmental issues •Contact an official to request that an environmental problem in my neighborhood be corrected •Recommend environmentally friendly actions 	<ul style="list-style-type: none"> •Watch TV programs to learn about environmental issues •Try to buy paper and boxes that I can reuse/recycle •Dispose of my mobile phone battery in the proper way 	<ul style="list-style-type: none"> •Voting for a public official due to his/her record on protecting the environment •Donating money and/or paying membership dues to environmental/conservation organizations •Recycling glass bottles, jars, or aluminium cans •Watching TV programs about the environment •Switching products because of environmental issues •Buying products made from recycled materials"

Figure 3–2, Pro-environmental behaviour (Rice, 2006; Martin & Bateman, 2014)

To this end, among Christians in the USA, religiosity has been proven to have a significant positive effect on Voting, Donating, Recycling, Buying recycled products (Martin & Bateman, 2014). Similarly, among Muslims in Egypt, religiosity has been proven to have a positive relationship with all pro-environmental dimensions and is significant in the public sphere and activist behaviours (Rice, 2006). However, the role of religiosity in avoiding food waste behaviour needs to be deeply explored.

3.2.2 The relationship between religiosity and food waste (generation/volume/quantity, behaviour, management) (Direct and indirect)

A wide attention has been received to study the food waste since the United Nations mentioned the food insecurity issue. Accordingly, reviewing the relevant literature partially covered the issue from economic, political, and behavioural perspectives. The current research focus is to study the food waste behaviour among households. Since households are the major contributors to food waste, the practices to limit it are a bit rare. Therefore, studying the relationship between religiosity and food waste behaviour includes the direction of such a relationship and its relevant theories, as well as the methodological dimensions, including application fields, seasonal time, measurements, and unit of analysis/observation.

The direct religiosity-food waste behaviour relationship

The direct relationship between the individual's religiosity and food waste behaviour has been discussed in the previous literature (Elmenofi et al., 2015; Abdelradi, 2018; Abiad & Meho, 2018; Aktas et al., 2018; El Bilali & Ben Hassen, 2020).

Although there is a paucity in the literature regarding the direct relationship, some scholars attempted to get that link. In this vein, the consumption behaviour changing during specific events, i.e., weddings, births, deaths, and social banquets, has been significantly proven to increase food waste behaviour. Like wisely, Islamic events can increase the food waste behaviour (Abiad & Meho, 2018; Aktas et al., 2018). These events take place every year in specific places and in every house.

Regarding place-based events or religious place events, the Kingdom of Saudi Arabia attracts millions of religious tourists to perform their worship in two cities: Makka and Madina (Al-Kandari & Jukes, 2012; Mu'azu et al., 2019). Three million attend every year to both cities to make their obligatory pilgrimage, "Hajj", in one month: Zul-Hijja month of the Hijri calendar. However, not all Muslims are financially able to perform the pilgrimage as it is very expensive. Therefore, Muslims are committed to performing Hajj at least once in a lifetime as one of Islam's five pillars, most importantly, if they are able to do so. Similarly, two million

visit the two cities in the holy month of Ramadan to perform the advisory pilgrimage “Umra” (Al-Kandari & Jukes, 2012). Some of the tourists stay from the holy month of Ramadan until the Zul-Hijja month (Mu’azu et al., 2019). These incredible numbers of tourists require huge amounts of food. Hence, a massive amount of waste will be generated. For example, more than 5000 tons of food have been wasted in Makka city in just one week (Mu’azu et al., 2019).

Another Islamic event that is held every year in every house is Fasting during the holy month of Ramadan (Elmenofi et al., 2015; Abdelradi, 2018; Abiad & Meho, 2018; Aktas et al., 2018; Haruvy et al., 2018; El Bilali & Ben Hassen, 2020). The holy month of Ramadan is the ninth month in the Islamic calendar. It is considered a blessed month. It lasts between 29 and 30 days based on the visual sight of the crescent moon. During this month, Muslims are ordered to re-evaluate their relationship with God, relatives, and community. They are committed to fast the whole daytime from the dawn time to the sunset time. They are not allowed to eat, drink, smoke, or have sex with their wives during fasting times every day (Odabasi & Argan, 2009; Haruvy et al., 2018). Accordingly, Muslims change their eating behaviour from 3 ordinary meals per day to two meals at night. Consequently, such changes in the eating routine (habit) directly increase the food waste in Qatar (Aktas et al., 2018) and Egypt (Elmenofi et al., 2015). Yet, the indirect effect between individual’s religiosity and food waste behaviour is well-studied.

The indirect religiosity-food waste behaviour relationship

The indirect relationship between the individuals’ religiosity and food waste behaviour has been studied/investigated by the mediation or moderation variables. First, the indirect mediated relationship has been studied through the individual’s environmental awareness, personal norms, activism, attitude, subjective norms, and materialism. Second, the indirect moderated effect has been investigated by the demographics, religiosity, education level, and socio-economic variables.

The first well-reported variable that can mediate the relationship between religiosity and food waste is the general awareness about the issue. Accordingly, scholars tested the role of environmental awareness to explain the relationship between food waste and its religious drivers (Abdelradi, 2018). Although the mediation effect can be constructed from both the direct effects of religiosity on awareness and from the awareness of food waste, the mediation effect of environmental awareness cannot be held for various reasons.

To begin, the relationship between environmental awareness and food waste was positive but not significant. The positive relationship reflects the attitude behaviour gap that contradicts the theory of planned behaviour can be established in ethical situations such as food waste minimization (Sudbury-Riley & Kohlbacher, 2016). Moreover, the insignificant half of the two paths that construct the indirect effect led to an insignificant indirect effect (Zhao, X. et al., 2010). In addition, the positive relationships of both paths of the indirect effect will result in a positive indirect effect, which means religiosity increases food waste through awareness. Such innovative relationships cannot be theoretically supported without more explanatory variables. Also, studying the religiosity and awareness effects in that research paper included in the regression equation with other variables that can establish a multicollinearity issue. In addition, the danger of surveying a small sample size is identical to studying over-sized samples, which can result in type 1 error (Hair et al., 2019; Memon et al., 2020), such as what happened in Abdelradi (2018) research with $n=1000$, while the minimum was 200 participants. Due to such reasons, the author was not able to justify the mediation effect and investigated following the theory of planned behaviour in further research.

Moreover, although personal norms and activism have been proven to have mediation roles between religiosity and food waste reduction intentions, the attitude towards food waste reduction, injunctive norms, and descriptive norms have not (Elhoushy & Jang, 2020). This is due to studying the five possible mediators in one model without splitting the model for each single indirect path. Studying the multiple mediators can be done sequentially or in parallel (Hayes,

2013). However, studying the multiple mediators requires studying the single effects first in order to specify the effect size of the multiple mediation effect. Moreover, while the previous research seems more realistic to study the indirect mediation effect as it focuses on food waste reduction instead of the food waste generation that almost produces a competitive mediation effect, the current research focused on the intrinsic and extrinsic religiosity dimensions in a higher order construct (Allport & Ross, 1967). In addition, some variables lack the development process and were based on inaccurate/irrelevant context. Finally, although religiosity has a significant and positive effect on all possible mediators: personal norms, activism, attitude, inductive norms, and descriptive norms, only personal norms and activism have a significant positive effect on the intention to reduce food waste. Hence, although the current possible mediation follows the theory of planned behaviour, the attitude and subjective norms did not mediate the religiosity-food waste relationship.

Finally, another recent research explored the negative mediation effect between religiosity and ethical consumption behaviour. By investigating the materialistic personality, religiosity has a significant negative effect on materialism, which, in turn, has a significant negative effect on ethical consumption behaviour. By multiplying both paths, the indirect positive effect was significant as well in explaining the positive relationship between religiosity and ethical consumption (Adil, 2021). This sounds innovative as it means people with high religiosity and commitment have low materialistic values. Such materialism value reduces the ethical consumption attitude.

The indirect-moderator religiosity-food waste behaviour relationship

Furthermore, besides the direct and indirect-mediated relationships, the indirect-moderated relationship between religiosity and food waste has been investigated but has not been studied yet. The main reason for this is that, mostly, the moderator variables are categorical variables that require quota, stratified, or cluster sampling design, which makes it difficult to sort for one variable. Even the continuous latent variables are advised to be studied using Multi-Group Analysis (Hair et al., 2017; Cheah et al., 2020) by dividing the sample into high vs. low levels of the moderator variable. Accordingly, the minimum sample size cannot

be easily met to balance the various subsample sizes based on such levels. Accordingly, the relationship between religiosity and various sustainable behaviours literature is investigated to explore the possible moderator variables.

Among the possible moderator variables, the strongest demographic factor that can affect environmental behaviour is the individual's gender (Martin & Bateman, 2014). In the same vein, while the awareness level has a significant positive effect on the intention to avoid food waste in the female group, the males have insignificant negative effects for the same path. Similarly, the intention to avoid food waste has a significant negative effect on food waste. The same path is insignificant positive in the male group (Aka & Buyukdag, 2021). This confirms the higher levels of engagement in ethical consumption behaviour in females than in men (Sudbury-Riley & Kohlbacher, 2016). Therefore, the gender effect has been investigated to moderate the religiosity-food waste relationship (Baig et al., 2019; Adil, 2021).

Moreover, the consumer age is reported as a moderator in the previous consumption behaviour research (Odabasi & Argan, 2009). With this respect, young consumers are more likely to vote for the officials who supports sustainability issues as one of the eco-centric dimensions (Martin & Bateman, 2014). However, the older consumers have less food waste behaviour than young ones (Abdelradi, 2018). These controversial results led to a study the consumer age encouragement in the future (Baig et al., 2019).

Other demographical factors have been reported to possibly moderate the food waste behaviour and its drivers' relationships such as Education level. In this regard, the higher education level households tend to have less food waste behaviour (Odabasi & Argan, 2009; Abdelradi, 2018). However, among the five dimensions of special consumption behaviour during the holy month of Ramadan, the lower education level participants tend to have higher media consumption, spiritual pleasure, attractiveness, and nostalgia (Odabasi & Argan, 2009). Therefore, such vague results of the educational levels are encouraged to be a possible moderator in further research, especially with more specific variables such as religious education level (Adil, 2021).

Also, marital status was found to have a significant effect on the relationship between awareness, habits, and intentions to avoid food waste. In this regard, the awareness level has an insignificant effect on the habit among single consumers, but this relationship was significant and positive in the married ones. Similarly, the intention to avoid food waste has a significant positive effect on the habits among single consumers, but the same relationship was insignificant positive among married ones. Finally, the intention to avoid food waste has a significant negative relationship with food waste behaviour among married people, but this relationship is insignificant among single ones (Aka & Buyukdag, 2021)

Finally, the household size was reported to have a positive effect on the generated food waste (Abdelradi, 2018). Also, the household income level has a positive effect on the food waste (Abdelradi, 2018). However, people with low income have a higher attitude towards the media, culture, and nostalgia in Ramadan-specific consumption than higher-income people (Odabasi & Argan, 2009). In addition, urban residents have a slightly higher engagement level with the environment than rural residents (Guth et al., 1995), yet there are no significant differences between both living places regarding eco-centric behaviours (Martin & Bateman, 2014). Therefore, researchers encourage further research to include such socioeconomic variables (Adil, 2021), especially culture and geographic areas (Aka & Buyukdag, 2021). To this end, it is obvious that the relationship between the individual's religiosity and food waste behaviour is both direct and indirect, as in figure 3–3.

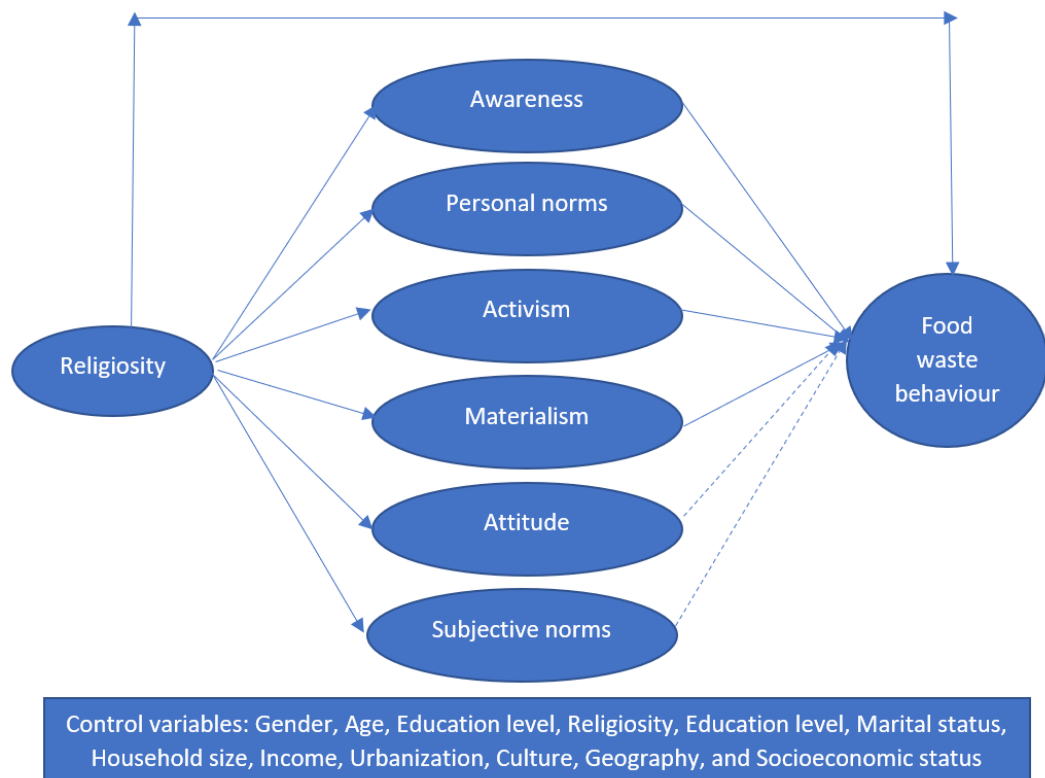


Figure 3–3, Conceptual model of the religiosity-food waste relationship

Apparently from figure 3–3, the direct effect of religiosity on food waste behaviour could be insignificant for various reasons. Among them is the well-established indirect effect through mediator(s) and moderator(s). In addition, the various application fields/countries/cultures limit the results' generalization. Also, various demographic and socio-demographic variables that influence the relationships sophisticate the study of the religiosity-food waste relationship. In addition, studying the food waste during the whole year without excluding the events, especially the holy month of Ramadan's banquets. Finally, the various measures of both constructs reduce the relationship stability. For instance, religious teachings awareness is different from religious commitment, and the generated food waste volume is different from food waste behaviour. Accordingly, the relationship between religiosity and food waste can be hypothesized in this research as follows:

H1: Religious commitment has a significant direct effect on food waste behaviour.

3.3 Religiosity and materialism

There are few studies that attempted to test the relationship between religiosity and materialism. Although some of them found a direct negative one-way relationship, others failed to prove it. This is due to several limitations. For instance, the effect of religiosity on materialism is affected by several factors, such as the measurement of religiosity, religious affiliation, and consumer culture. It is also mediated by subjective well-being. Hence, the current section focuses on the previous attempts to test the aforementioned relationship and discusses their limitations.

Although it is debated that religiosity is against materialism values, studies failed to prove its significance in both Muslim households in Egypt (Adib & El-Bassiouny, 2012) or Qatar (Sharif, 2016), and the non-Muslim consumers (Lindridge, 2005) in Western Germany and the UK. Hence, it would be inaccurate to conclude the negative relationship only between the two constructs (Souiden et al., 2018; Agarwala et al., 2019; Habib & Bekun, 2021).

To explain this, religious consumers do not significantly oppose materialistic values. Instead, they display their wealth by buying luxury products. Such buying intentions are mediated by the consumer's affective attitude and self-representation (Arli et al., 2016). For instance, religious households send signals of their wealth to others through excessive and luxury consumption behaviour (Sharif, 2016). However, religious consumers understand that their status consumption may be perceived as unethical behaviour. Accordingly, they try to correct their consumption path by donating to charitable organizations and sustainable and environmental campaigns (i.e., green marketing).

To this end, religious consumers who have materialistic values suffer from paradoxical feelings, sending signals about their wealth (materialism) vs. supporting non-profit organizations (ethical behaviour) (Sharif, 2016). To explain these opposite feelings, the Muslim religious people host Ramadan's banquets to apply the Islamic teaching of relatives' connectedness and generosity. However, due to the pulling power of materialism, the ethical behaviour of generosity and connectedness is masked by the unethical excessive food preparation and waste. Accordingly, this divergence between intended ethical

and unethical materialistic behaviours reflects the distinct role of materialism when it interrupts good intentions and shifts them to another bad behaviour.

More specifically, unlike internal religiosity, the external religiosity dimension has unclear results. Religiosity activities such as attending worship houses may lead to materialistic values upsurge (Veer & Shankar, 2011; Minton et al., 2016). This is due to the psychological connection between external religiosity and status-seeking behaviour and performing religious teachings for show. Accordingly, external-oriented religious people have materialistic values to show their religiosity levels by maintaining/structuring their religious identity (Minton et al., 2016). Consequently, for the social identity theory lens, religious persons who lose/fear losing his/her membership in the in-group religious community try to maintain/support it by showing external religious commitment. In addition, in line with the Justification-Suppression Model, religious people who discover their external religiosity and are suppressed by materialistic values justify their intentions to luxury/excessive consumption behaviour (Veer & Shankar, 2011).

Moreover, not all religions are against materialistic values. The Buddhist faith is indeed not against materialism (Lindridge, 2005; Pace, 2013). Instead, the psychological dimension of the positive emotions towards the self (i.e., Uncompassionate and Unloving) encourages it (Pace, 2013). Moreover, the ultimate goal of Buddhists is not spiritual salvation (Moksha), but more human propensity and wealth values (Lindridge, 2005). To this end, the negative relationship between the two constructs is more significant and well-reported in the literature.

3.3.1 The negative effect of religiosity on materialism

The contradiction between religious teachings and the acquiring of materialistic values originated from humankind and its values (Belk, 1985; Stillman et al., 2012). Since religiosity is associated with the self-transcendence values anchor, materialism is clearly associated with the opposite anchor of self-indulgence in the famous Schwartz Value Scale (SVS) (Schwartz & Huisman, 1995). This materialism is confirmed in a dominant religious perspective as a bad innate of humankind that makes individuals keen on collecting things instead of spiritual

growth (Srikant, 2013). Accordingly, the social dimension of Buddhist doctrine that encourages positive emotions toward others (i.e., compassion and loving-kindness) does encourage Buddhists to avoid it (Pace, 2013). Similarly, the key argument of Christianity against materialism stems from the focus on material wealth, which distracts Christians from the true happiness of “God” (Veer & Shankar, 2011). Similarly, Hinduism clearly emphasizes the necessity of escaping from material life (Essoo & Dibb, 2004). Lastly, the religion of Islam is very rich in teachings that are against materialism.

Similarly, the Islamic religion doctrine is called “Sharī‘ah”. Such laws and rules govern all Muslim behaviours (Adil, 2021). According to the Islamic Sharī‘ah, Muslim behaviour is rewarded by good deeds or bad deeds. The materialism that leads Muslims to harm the environment using unsustainable practices is bad deeds. More specifically, Islam motivates people to donate their money, food, and clothes to needy people. A rich Muslim who does not do it will earn a bad deed even if s/he does not harm the environment. This is due to the Muslim community that will suffer from social inequality, envy and crimes (Souiden et al., 2018) due to not helping needy people. Hence, every Muslim should prioritise his/her life to obey the teachings as much as s/he can in the mortal life (Adib & El-Bassiouny, 2012)

For instance, one of the five pillars of Islam that any Muslim must believe and act upon is giving the money “Zakat” to needy people (i.e., 8 clusters of the rightful beneficiaries) every year (Essoo & Dibb, 2004). Moreover, Islam not only motivates Muslims to sacrifice, share and donate other types of material things/money to needy people to get good deeds but also encourages people to avoid unethical/unsustainable practices such as food waste (Raggiotto et al., 2018; Adil, 2021). Hence, religious people should avoid their materialistic values and not be poor.

Consistently, the belief that religious people must be poor (Veer & Shankar, 2011; Stillman et al., 2012) is challenged in Islam. The rich people are required to donate very little money from their money every year to the righteous needy people (2.5% of unused money on an annual basis). Hence, 97.5% of the unspent and unused money for a year will be saved for another year. In fact, the money

taken from the rich people every year is to purify and clean this money. Cleansing the Muslim donors from their materialistic values. Moreover, Islam considers *“those who are stingy and encourage people to be stingy and hide what Allah has bestowed upon them of His bounties”* (Qur'an 3, 37) will be in hellfire. Hence, the Islamic religion, such as other faiths, induces people to avoid the bad innate of materialism. Such a negative relationship has been intensively proved in the previous literature (Lindridge, 2005; Cleveland & Chang, 2009; Raggiotto et al., 2018; Adil, 2021; Habib & Bekun, 2021). For instance, the seminal work reviewing the literature on such relationships concluded that all religious-related constructs/dimensions (i.e., Rituals, beliefs, Community, and Values) lead to low levels of materialism (Agarwala et al., 2019). Yet, this well-established negative relationship can be explained by well-being (Agarwala et al., 2019).

Accordingly, religious people have high levels of subjective well-being and life satisfaction since they perform religious teachings. Among these teachings is the prayer, which is commonly shared between various faiths (Agarwala et al., 2019). Such a connection with God raises the spiritual relationship and enhances the gratitude, thanksgivings, praise, mood, and helps in alleviating the positive energy and, inspiration, and overall life satisfaction (Habib & Bekun, 2021). These feelings contradict the need for belonging that is developed by the person who fears isolation from the in-group or who is already isolated. Hence, there is no need to develop the materialistic value that leads to compensatory behaviour, e.g., status consumption. Moreover, the direct relationship between religiosity and materialism is affected by the measurement level of religiosity, religious affiliation, and consumer culture.

With regard to the measurement levels, unlike the negative relationship, the insignificant relationship or positive relationship between religiosity and materialism was obtained in the external dimension of religiosity (Lindridge, 2005; Minton et al., 2016; Raggiotto et al., 2018). This supports the use of the two dimensions of religiosity, namely, intrinsic and extrinsic (Allport & Ross, 1967). For instance, internal religiosity refers to following the core of the religious doctrine “Islamic Shari‘ah”. Yet, external religiosity is much related to practicing religious practices (i.e., prayers or donations of “Islamic Zakat”). Hence, the external dimension can easily be associated with status-seeking (Minton et al.,

2016) and implicitly included in the materialism category as a major criterion variable to the religiosity degree (Agarwala et al., 2019).

However, the use of the overall religious commitment inventory (Worthington Jr et al., 2003), or religiosity-food-related items (Abdelradi, 2018) are more accurate when applied to the Islamic religion since the two dimensions of religiosity are well-developed in non-Muslim communities. Moreover, the systematic literature review of the negative relationship between religiosity and materialism characterized religiosity into five dimensions; Rituals, Beliefs, Values, Community, and identity (Agarwala et al., 2019). Similarly, scholars attempted to combine various scales, as External religiosity can include behaviour and boding from other measures, and Internal religiosity can include belonging and identity from other measures, while religious affiliation is related to the belief (Minton et al., 2016). This confirms the limitations to the use of one developed scale to measure the religiosity in one religion and the failure to generalize it. It also highlights the difference between religious affiliation and religious commitment levels.

To this end, the effect size of religiosity and materialism differs according to various factors. Among these factors is religious affiliation. Since each faith has its own doctrine, the way the religious person believes in the divine, perceives the teaching, and acts accordingly is different based on the religious affiliation (Essoo & Dibb, 2004; Minton et al., 2016; Raggiotto et al., 2018). Therefore, there is a need to study materialism in one religion to avoid mixed and confused results (Minton et al., 2016). Moreover, not only does religious affiliation affect the negative relationship, but the immigrant generations also have different effect sizes. For instance, the second generation of Koreans (born in Canada) has a stronger negative effect than their parents (Korean moved to Canada). As the first generation suffers from settling in another community, there is a need for status-seeking. Hence more materialism is boosted (Cleveland & Chang, 2009). Finally, the relationship between religiosity and materialism differs from one culture to another (Lindridge, 2005; Cleveland & Chang, 2009). For instance, Indians living in London have materialistic values lower than their peers in Asia (Lindridge, 2005). Hence, it is recommended to study individualistic vs. collectivistic cultures when studying materialism (Santini et al., 2017; Dang et al.,

2021; Ni, 2021). Other demographic variables are also reported to affect this relationship, such as age, gender, income, and economic status (Loh et al., 2021). For instance, the research provides evidence of the parent's role in transmitting their materialism to their children within one household in a Muslim country (Adib & El-Bassiouny, 2012).

Accordingly, the religiosity-materialism negative relationship is explained in line with the Justification-Suppression Model (Veer & Shankar, 2011), Fear of Missing Out theory (Long et al., 2021), Social Comparison theory (Sharif, 2016), and social identity theory (Sharif, 2016; Dinh & Lee, 2021). To illustrate this, the religious person who feels in-group fears to miss any updates to maintain his/her membership. In order to do this, s/he activates the comparison with other members of the group (colleagues/relatives in Ramadan banquets). When s/he feels there is a risk of missing something that causes exclusion from the group, suppresses the religious values to justify the materialistic intentions (excess food preparation for the banquet) as a coping (compensatory) behaviour to face the generated fears. Hence, the religiosity-materialism can be hypothesized in this research as following:

H2: Religious commitment has a significant negative direct effect on materialism.

3.4 Materialism and sustainability

Although materialism has been reported to have positive consequences, such as boosting the economy by speeding up the commercial movements of products which increases community life satisfaction by achieving needs and desires, the research clearly warned the negative effects of materialism on individuals and society (Stillman et al., 2012; Srikant, 2013). For instance, materialism cannot achieve the endless needs/ desires of a person due to financial limitations. It is also against the minimalistic consumption values (Chen et al., 2024; Lu & Sinha, 2024), and the ethical values that should be existed in the society (Arli et al., 2016; Sharif, 2016; Raggiotto et al., 2018). Upholding such unethical values leads to a reduction in consumption-oriented practices, a shift towards a more environmentally friendly lifestyle, and greater support for environmental activities (Booth, 2021).

Moreover, the three materialism beliefs, namely, happiness, success, and acquisition-centrality, are significantly proven to reduce environmental beliefs such as Ozon depletion, global warming, pollution, resource shortage, and species extinction (Kilbourne & Pickett, 2008). Such result was confirmed by the meta-analysis between the materialism values and pro-environmental attitudes and behaviours (Hurst et al., 2013). More specifically, the materialism reduces the environmental awareness (Abdelradi, 2018; Diaz-Ruiz et al., 2018) which is reflected in decreasing the ethical behaviours (Adil, 2021), such as carbon-tax payment intentions (Dang et al., 2021). In addition, it significantly increases the unethical behaviours (Cui, P. et al., 2021) such as the food waste generation among households (Abdelradi, 2018; Diaz-Ruiz et al., 2018). Hence, this relationship can be tested by the following hypotheses:

H3: Materialism has a significant positive effect on food waste behaviour.

3.5 Religiosity-materialism-food waste

Merging H2 and H3, the mediation role of materialism between religiosity and food waste can be concluded. Such an indirect relationship is confirmed in the literature. For instance, the materialism has a partial mediation effect between the religiosity and ethical consumption (Adil, 2021), impulsive buying behaviour (Habib & Bekun, 2021). Such a mediation effect differs from a competitive or complementary role. To this end, the research proved that materialism complementary (competitive) mediates the intrinsic (extrinsic) religiosity and Ecologically Conscious Consumption Behaviour (Raggiotto et al., 2018). It was also reported to have a competitive mediation effect between spirituality and conspicuous consumption behaviour (Stillman et al., 2012). It is worth noting that the way the mediation role of materialism is explained depends on the religiosity measurement, low order vs. second order of intrinsic and extrinsic dimensions. Moreover, the complementary mediation role occurs when both direct relationships have the same sign, such as negative-negative and positive-positive. Any difference between the signs of the two direct paths leads to competitive intervention. Therefore, some scholars mentioned the competitive (complementary) mediation effect when measuring the tendency of negative (positive) outcomes, such as food waste generation (avoidance). Hence, the indirect relationship can be formulated as follows:

H4: Materialism mediates the relationship between religious commitment and food waste behaviour.

3.6 Loneliness and compensation behaviour

Loneliness in the holy month of Ramadan can be increased, as previously discussed. However, the lonelier understands his/her distress and has many self-regulatory options to reduce its severity instead of visiting a psychotherapist (Masi et al., 2011; Loh et al., 2021). Such regulatory behaviours seek to compensate the social and emotional isolation through materialism (Loh et al., 2021). To this end, the corrective regulatory actions to compensate for the feeling of loneliness can be shopping, extensive reading, gardening, and eating. More specifically, people consume warmer (Ong et al., 2015), or comfort (Troisi & Gabriel, 2011) foods such as chicken noodle soup to alleviate loneliness.

Therefore, within COVID-19 pandemic restrictions, people preferred eating by spending more time at home instead of dining out, spending much time cooking in the kitchen to produce modern recipes (Minawi et al., 2020). In this regard, fasting Muslims, during Ramadan and COVID-19 time, think more about eating instead of other strategies to mitigate their feeling of loneliness.

More specifically, responsible women in Muslim households must prepare the food for the breakfast meal every day for their household. Hence, they are susceptible to regulating their feelings of loneliness by inviting guests from extended family or friends of theirs or their husbands to the banquets. Such banquets normally have excessive food to keep the guests satisfied, rather their hungry. Hence, excessive food preparation can be used as a means to mitigate the feeling of loneliness, as in figure 3–4.

H5: the feeling of a) emotional and b) social loneliness has a significant positive effect on food waste behaviour.

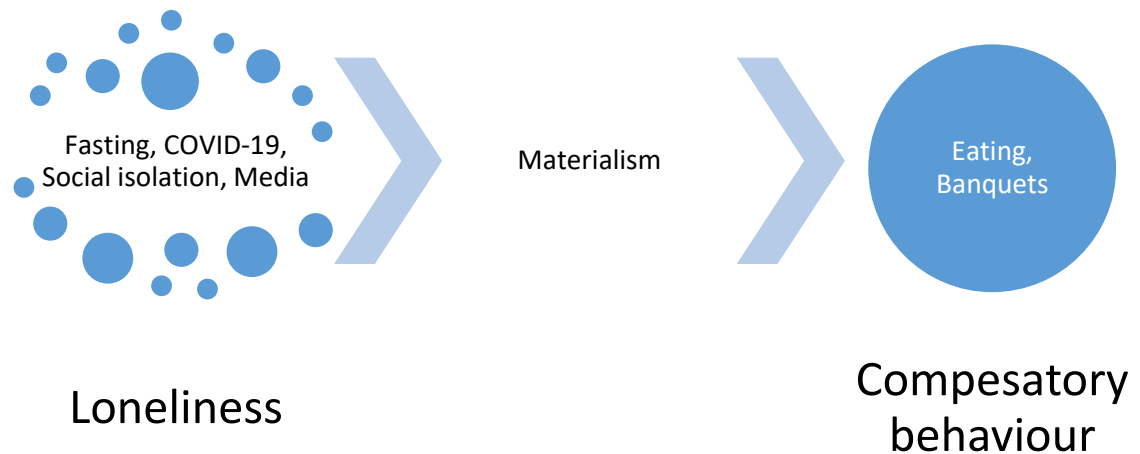


Figure 3–4, Loneliness and compensation behaviour for fasting Muslims

Moreover, the relationship between the feeling of loneliness and materialism is complex. One meta-analysis supports the proposition that individuals with depression and isolation are more materialistic ones (Santini et al., 2017), in Eastern culture (Loh et al., 2021) and western one (Pieters, 2013). Such a relationship has been extended within COVID-19 pandemic (Moldes et al., 2022). Yet, while scholars focused on the emotional loneliness when studying the materialism (Loh et al., 2021), others focused on the success and acquisition dimensions of materialism when studying loneliness (Pieters, 2013). Moreover, the bidirectional relationship between both constructs and their dimensions has been introduced (Pieters, 2013).

More critically, loneliness has two main dimensions: emotional and social. While emotional loneliness stems from the lack of intimate relationships with partners/ close friends, social loneliness can be developed from the absence of a broader group of family, friends, and neighbours (de Jong-Gierveld, 1989; Rippé et al., 2018; Loh et al., 2021). Although the overlap between the two dimensions has been reported (Masi et al., 2011; Wang, J. et al., 2012), the discrimination between them gives more detailed and accurate implications. In addition, it has been reported that individual who can influence others' preferences tends to be more materialistic (Santini et al., 2017). Consequently, a responsible woman for preparing food in a Muslim household may face two types

of loneliness due to fasting within COVID-19 measures. Hence, the current research will incorporate the two dimensions of loneliness while studying its effect on materialism.

Moreover, the mixed results of the relationship between loneliness and materialism included the materialism construct and its three dimensions. In addition, it included the one and bidirectional effect. First, the feeling of loneliness has a significant positive effect on the successfulness and happiness, while it has a non-significant effect on the centrality (Pieters, 2013). Although this relationship has been confirmed in Western culture, the replication of such results in Eastern culture is absent. Moreover, the relationship between the three dimensions of materialism and loneliness has been reported as bidirectional, as the feeling of loneliness leads to an increase the materialistic values, which is subsequently supposed to reduce the feeling of loneliness (Pieters, 2013). However, the mainstream of the research supports the one-way relationship (Santini et al., 2017), since it has been confirmed that materialism can increase loneliness instead of mitigating it (Pieters, 2013). Yet, studying the two-way relationship between both constructs is limited to the longitudinal research design (Pieters, 2013).

Moreover, the successfulness and happiness were confirmed to be affected by the loneliness more than their effect on the loneliness, but the acquisition centrality has a different influence. More specifically, in the acquisition centrality dimension, it is proved that loneliness has a non-significant positive effect on acquisition centrality, while the latter has a significant negative effect on loneliness. This means the acquisition centrality can be used as a cure to mitigate the feeling of loneliness (Pieters, 2013).

To this end, the responsible woman in the Muslim household may have different perspectives on this relationship since she is fasting and responsible for the whole household while preparing the extra food for the social banquets. Also, the banquets may be invited to relief the social, emotional, or both needs. Therefore, the effect of loneliness on materialism depends on the types of loneliness as it depends on the dimensions of materialism. However, materialism will be included in this research as a second-order construct due to a clear focus

on the construct. Its dimensions will be tested in the post hoc analysis after confirming the unidimensionality vs multidimensional measurement level in the data analysis. Hence, this relationship can be formulated as follows:

H6: The feeling of a) emotional and b) social loneliness has a significant positive effect on materialism.

Combining the three hypotheses of the loneliness on food waste behaviour (H5), loneliness on materialism (H6), and materialism on food waste behaviour (H3), the indirect relationship between the feeling of loneliness and food waste behaviour through materialism can be formulated as follows:

H7: Materialism mediates the relationship between the feeling of a) emotional, b) social loneliness and food waste behaviour.

3.7 Relevant theories

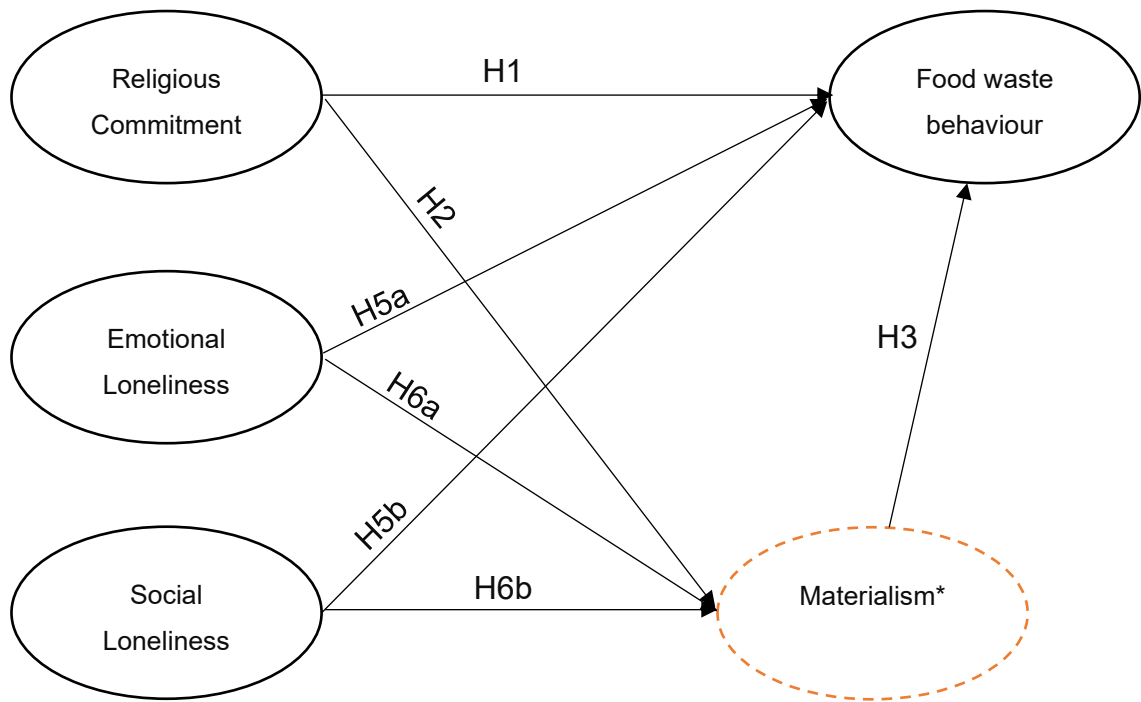
It is important to highlight the role of scientific theories in explaining the current conceptual model and its related hypotheses. In this regard, the *Stimulus-Organism-Response SOR model* (Mehrabian & Russell, 1974; Turley & Milliman, 2000; Vieira, 2013) provides the framework of the current research model. For instance, the surrounding environment (Stimulus) of the Muslims included banquets in Ramadan as religious commitment towards family and other Muslims and the increased feeling of loneliness due to COVID-19 measures. Such an environment can trigger Muslim feelings of materialism (organism) by inviting more guests to the banquets and preparing extra food for each banquet. This, in turn, resulted in increasing food waste behaviour (Response).

From a more detailed lens, the *Theory of Planned behaviour* (Ajzen & Fishbein, 1980) and the *Theory of Reasoned Action (TRA)* (Ajzen & Fishbein, 1980) can support the positive relationship between attitude and behaviour. In this regard, the triggered intention or attitude by materialistic values to prepare the extra food for the banquet most probably results in wasting the food even the Islamic teaching denies it.

Indeed, this is supported by the *attitude-behaviour gap* which claims that the consumer attitude cannot lead to specific behaviour in ethical situations (Sudbury-Riley & Kohlbacher, 2016). Therefore, the attitude to reduce food waste may not be enough to stand against materialism to increase food waste.

Moreover, from the *social exchange theory* (Thibaut & Kelley, 1959; Harrigan et al., 2018), people make decisions to engage in a social exchangeable relationship depending on cost-benefit analysis. Therefore, Muslims invite relatives/friends to enhance their connectedness with others as well as increase the prepared food volume to enhance their perceived self-image.

More specifically, *social identity theory* confirms this relationship (Tajfel, 1981; Tajfel & Turner, 2004; Agarwala et al., 2019; Yoganathan et al., 2021). For instance, each Muslim who belongs to his/her in-group prefers to maintain this membership. Similarly, Muslims who suffer from losing their membership have the desire to rebuild it again to be in-group instead of being out-of-group. Therefore, the compensation behaviour of hosting banquets during Ramadan is one way to maintain or rebuild the Muslim membership, especially with extra prepared food that may hold the social identity. Figure 3–5 shows the conceptual model with its hypothesized relationships.



*Indirect mediated relationships:

H4: Religious commitment ----> Materialism ----> Food waste behaviour.
 H7a: Emotional loneliness ----> Materialism ----> Food waste behaviour.
 H7b: Social loneliness ----> Materialism ----> Food waste behaviour.

Control variables:

- Woman's age, work pattern, education level, and marital status.
- Household size, monthly income, socioeconomic status, and living area.
- Country culture and economic development level.

Figure 3–5, Conceptual model.

Eventually, the current research hypotheses can be listed as follows:

H1: Religious commitment has a significant direct effect on food waste behaviour.

H2: Religious commitment has a significant negative direct effect on materialism.

H3: Materialism has a significant positive effect on food waste behaviour.

H4: Materialism mediates the relationship between religious commitment and food waste behaviour.

H5: the feeling of a) emotional and b) social loneliness has a significant positive effect on food waste behaviour.

H6: The feeling of a) emotional and b) social loneliness has a significant positive effect on materialism.

H7: Materialism mediates the relationship between the feeling of a) emotional, b) social loneliness and food waste behaviour.

3.8 Stakeholders' implications:

This section supports the literature review with each stakeholder's role in preventing food waste, namely, policy, industry, and consumer perspectives.

3.8.1 Policy

Government policies are instrumental in preventing food waste by establishing regulations and guidelines that influence the behaviour of both businesses and consumers. Policies can set food waste reduction targets, promote food donation, and support public awareness campaigns. For example, regulations that require businesses to report and reduce their food waste can drive significant changes in industry practices (Devin & Richards, 2018). Additionally, policies that incentivise sustainable practices, such as tax breaks for companies that donate surplus food, can further encourage waste reduction. According to the Food Waste Index Report (2024), effective policy measures have been shown to significantly reduce food waste at various stages of the supply chain. Governments also play a pivotal role in educating the public about food waste's environmental and social impacts, fostering a culture of responsible consumption (Sutinen & Närvänen, 2024).

Policies also consider cultural and religious practices that influence food waste. For instance, during Ramadan, Muslim families often prepare large quantities of food for banquets, which leads to increased food waste. Policies could promote awareness campaigns encouraging more sustainable practices during religious events, such as planning meals more carefully and donating excess food without embarrassment. Additionally, feelings of loneliness that may lead to over-preparation of food can be part of comprehensive food waste reduction strategies. For instance, promoting eat-related religious teaching as a coping strategy to mitigate the fear of being negatively evaluated by others. Tools of Change highlights successful case studies like "Rising Food Costs Support Food Waste Reduction", which might suit the Muslim communities in underdeveloped economies.

3.8.2 Industry

The food industry, encompassing producers, retailers, hotels, and restaurants, has a substantial impact on food waste prevention. Businesses can implement various strategies to minimize waste, such as improving inventory management, optimizing supply chains, and adopting innovative technologies for food preservation. Retailers can reduce waste by offering discounts on near-expiry products, especially during Ramadan, and donating unsold food to charities. Moreover, the industry can influence consumer behaviour through marketing campaigns that promote sustainable consumption and provide clear labelling of food products to help consumers make informed decisions. By adopting a customer-centric approach, as suggested by Singh et al. (2018), businesses can align their practices with consumer demand for sustainability, thereby reducing food waste (Sutinen & Närvänen, 2024).

The Food Waste Index Report (2024) highlights that industry-led initiatives have successfully reduced food waste by up to 20% in some sectors. Additionally, Tools of Change case studies like “Flash Food” and “Too Good to Go” demonstrate how technology can help reduce food waste by connecting consumers with discounted food nearing its “best-before date”. The industry can also play a role in addressing materialism and promoting more sustainable consumption patterns, particularly during periods of high consumption, like Ramadan. By offering smaller portions and promoting the sharing of meals, businesses can help reduce the tendency to over-purchase and over-prepare food, especially for Ramadan banquets. Campaigns should focus on encouraging life satisfaction and happiness felt by the near family rather than extended family or other social groups to regulate the feeling of loneliness.

3.8.3 Consumers

Consumers are the end users who lead the whole market, not only food waste management, but household waste constitutes a significant portion of total food waste by 60%. Individual behaviours, such as meal planning, proper food storage, and mindful purchasing, can greatly reduce the amount of food that ends up in the trash, especially during Ramadan banquets. Moreover, educating consumers about the environmental and economic impacts of food waste, as well as providing practical tips for reducing waste, is essential. For instance, as early

materialistic parents transmit their material values to their children (Li et al., 2021; Santini et al., 2018), they can easily transmit the relics teaching of eating and food waste behaviour. Given that consumers are directly responsible for their purchasing and consumption habits, they have the power to make immediate and impactful changes. The focus on consumers in this research is because they are the end-users of the food supply chain, and their actions directly influence the amount of food wasted instead of shifting the responsibility from the higher to lower tiers of the supply chain due to power conflict. By understanding and addressing the factors that drive consumer behaviour, such as the influence of religiosity, loneliness, and materialism, effective strategies can be developed to promote sustainable consumption and significantly reduce food waste (Jain et al., 2018; Aka & Buyukdag, 2021).

Moreover, the Food Waste Index Report (2024) indicates that consumer education and behaviour change campaigns have led to a 15% reduction in household food waste in participating regions. Tools of Change also highlights programs like “Fridge Night”, encouraging consumers to use up expiring perishables and reducing food waste and associated greenhouse gas emissions. Additionally, addressing the emotional and social aspects of loneliness that may lead to over-preparation of food, can be part of comprehensive food waste reduction strategies. For example, promoting community meals and food-sharing initiatives can help reduce the sense of isolation and the tendency to prepare excessive amounts of food.

3.9 Chapter summary:

This chapter discussed the relationships between the research variables, distinguishing between direct vs. indirect, directional vs. non-directional, and one-way vs. two-way relationships. It utilised relevant theories to establish these relationships and compiled a theoretical model for the current research with relevant implications. Building upon this theoretical framework, Chapter Four will outline the research methodology, including the data collection and proposed analysis techniques used to test these hypothesized relationships empirically.

Chapter 4 Research Methodology

“No amount of experimentation can ever prove me right; a single experiment can prove me wrong”

Albert Einstein

4.1 Introduction

This chapter consists of two main sections, the philosophical paradigm and the research studies. While the first part explains the detailed research philosophies and reasoning approaches in social sciences, the second part illustrates the three studies of the current research. Finally, the last part shows the proposed statistical analysis plan as in figure 4–1.



Figure 4–1, Research methodology chapter map

4.2 Philosophical paradigms

Three main research philosophies can be presented to posit the link between the current research perspective(s) and theory development. Also, two reasoning approaches reflect the researcher's way of thinking to introduce suitable strategies for research studies.

4.2.1 Research philosophies and perspectives

The importance of studying the research philosophies stems from the embedded assumptions in each. Such assumptions regulate the research strategies and methods (Saunders et al., 2009). In this regard, the main research philosophies are the Ontology and Epistemology (Saunders et al., 2009; Bryman, 2012). Figure 4–2 shows the main classifications of research philosophies.

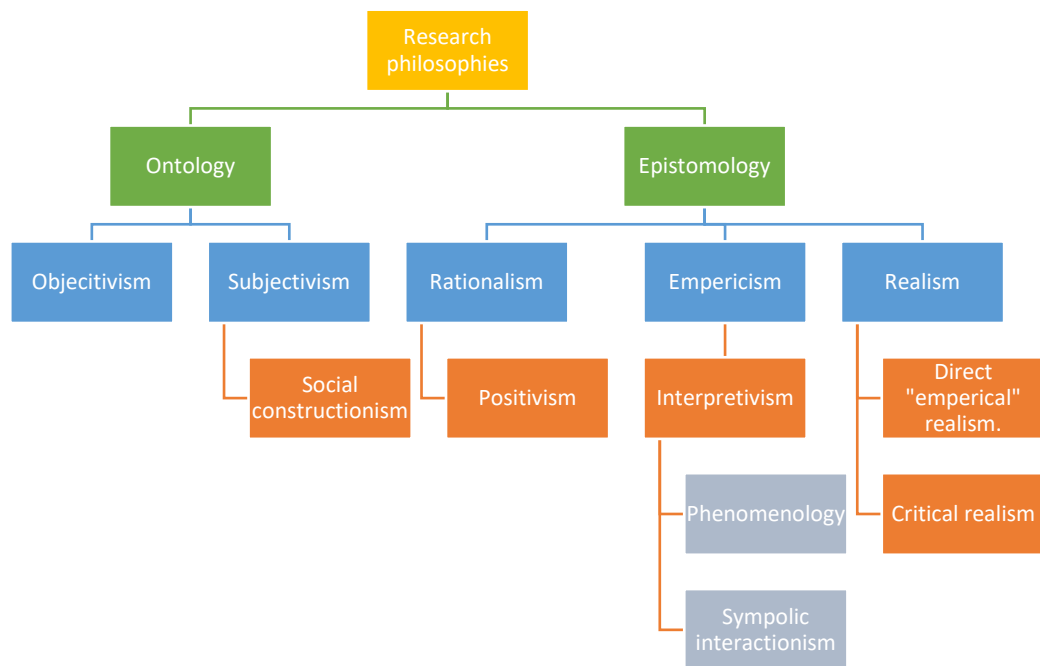


Figure 4–2, Research philosophy classification

4.2.1.1 Ontology philosophy

The ontological theory refers to the “way the world operates” or “what is being there”, which guides the research questions based on two opposite paradigms, namely, Objectivism and Subjectivism (Given, 2008; Saunders et al., 2009).

First, objectivists perceive the social entity as a “social phenomenon and their meaning” that exists in reality despite the role of social actors or is totally

independent of the social actors. Hence, it focuses on the tangible components like PCs, machines, rules and policies in the organizational culture (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). In this regard, the Islamic teachings in the Holy book of the Holy Qur'an and Muslims' prophet (PBUH) advice can be considered in the current research from the objectivistic point of view.

Second, the subjectivist believes that the social actors create the social entity (Saunders et al., 2009). It depends on the social constructionists (constructivism) who believe that the social entity continuously developed with a "constant change" and "constant state of revision" in reality by the interaction between the social actors and their understanding of the social entity, even the researcher can be utilized as a subject of those social actors. Hence, it cannot be isolated from the social actors' interactions. In other words, it is based on the researcher's unique personality and skills rather than the definitive reality (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). In this regard, the religious teachings that exist in the holy book of the Holy Qur'an and Muslim's prophet (PBUH) advice must be aligned with the Muslim commitment level.

To this end, the current research adopts social constructionism to judge the subjective reality based on the social actors' interactions. For instance, God says, "*And the soul, and He who formed it. And inspired it to its immoralities and its righteousness. Successful is he who purifies it. And failing is he who corrupts it.*" (Qur'an 91, 7-10). Also, it says, "*Whoever works righteousness benefits his own soul; whoever works evil, it is against his own soul: nor is thy Lord ever unjust (in the least) to His Servants*" (Qur'an 41, 46). Which give Muslims full control on his/her behaviour. Such control creates the reality be interacting with the social entities. Similarly, the "objective" household food waste volume depends on the wasting behaviour that is created by the social and psychological "interactions" states (i.e., materialism and loneliness).

4.2.1.2 Epistemology philosophy

The epistemological philosophy regulates the appropriate level of knowledge about the social world. In other words, it is interested in the extent of applying the natural science principles, methods, and ethos in social science (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). For instance, two opposite researchers'

perspectives can illustrate the application of the natural sciences to social science, namely, the Rationalist and the Empiricist (Walliman, 2006). In this regard, the Rationalist (the resource researcher) believes in gaining knowledge by reasoning (deductive), and the social reality can be represented by the objects. Moreover, the Empiricist (the feeling researcher) believes in gaining knowledge by sensory experience (inductive), and the reality can be represented by the social reality cannot be seen, measured, or modified. (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). Further, the preceding discussion of rationalism vs. empiricism can be detailed in other ways of the pursuit of knowledge, namely, positivism, interpretivism, and realism (Walliman, 2006).

First, the positivism holds the application of the natural science methods to study the social science and beyond. It can test theories and establish scientific law using cause-and-effect relationships. For instance, the observed social reality “resources” and the research outcomes can be generalized such as the natural sciences’ experiments. Therefore, it uses previous knowledge and hypothesis testing to develop current (new) theories. It depends on a highly rigid structured methodology to help in the replication process to reach the reality of “facts” or “objects”, not impressions. To this end, the researcher must be independent from the research to help in the replication (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). Thus, the current research adopts this approach since it follows the literature review, hypotheses development, and hypotheses testing to develop the current theoretical relationship between household spirituality and sustainability behaviour (Saunders et al., 2009).

Second, the interpretivism epistemological position advocates the social reality is created by the human mindset. This does not mean the world does not exist; rather, it can be personally experienced. Such experience depends on everyone’s beliefs, “feelings”, and preconceptions. Hence, the researcher must engage with the research by highlighting the subjective, individual, and creative aspects of society. In other words, interpretivism is against the application of “limited” scientific methods; instead, they are influenced by other intellectual traditions, share the view of the social actors, grasp the subjective meaning of the social action, and aim to reveal the meaning and interpretations (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). Two intellectual traditions build

interpretivism: phenomenology and symbolic interactionism. While phenomenology refers to the way humans make sense of the world, the interactionist understands the world as a continuous process of interpretations and revisions from the social actors (Saunders et al., 2009).

To this, the current research can adopt symbolic interactionism based on the constant change in the direct and indirect relationship between spirituality and sustainability behaviour. The change in the religious commitment in Islam is logically acceptable and encouraged. Hence, good or bad actions can expectedly occur. In this regard, the Muslim prophet (PBUH) said, *“By the One besides Whom there is no true god! Verily, one of you would perform the actions of the dwellers of Jannah until there is only one cubit between him and it (Jannah), when what is foreordained would come to pass and he would perform the actions of the inmates of Hell until he enters it. And one of you would perform the actions of the inmates of Hell, until there is only one cubit between him and Hell. Then he would perform the acts of the dwellers of Jannah until he would enter it”* (Sunnah, Riyad as-Salihin 396).

Third, the realism refers to what the scene shows us is the reality. It is against the perception of reality based on the mind (i.e., idealism). It assumes following the scientific steps like positivism but for two purposes: direct realism and critical realism. While empirical “direct” realism accepts the reality “definitive reality” that can be perceived by our senses and such reality cannot be changed (Bryman, 2012), critical realism accepts the inaccurate reality since it depends on the way we experience it by our limited senses. In other words, both realists apply the scientific methodology to prove the reality of “things + senses” that already existed in “direct realism” or to critically explain part of the changing reality based on our senses “ , things + senses + mental process”. Hence the reality can be changed or reviewed based on the social actor perspective (Saunders et al., 2009). Moreover, unlike positivism, critical realism does not link the theory with the phenomena. Instead, the theory can be developed by the social events and interpreted according to the social actor's understanding and revisions (Walliman, 2006). To this end, for the same clue of adopting symbolic interactionism, the critical reality is adopted, too.


To this end, it seems that positivism (i.e., rigid and highly structured methodology) as an epistemology position is consistent with objectivity as an ontology position. However, critical realism fits the symbolic interactionism of interpretivism, which “explains the perceived partial changeable reality” as an epistemological position that suits the subjective constructionism on ontology.

More specifically, if the reality is there apart from the researcher's existence as the objectivity, positivism, and direct realism assumptions, it also can be explained by describing the way the people perceive it in the phenomenology assumptions. Further, such reality is subjected to constant change and revision by people and researchers by adopting critical realism, symbolic interactionism-interpretivism, and subjective ontology assumptions. This means the current research adopts the Pragmatism philosophy that holds a high number of epistemological assumptions (Saunders et al., 2009).

4.2.1.3 Pragmatism: the underlying philosophy of the current research

The pragmatism philosophy holds the shared assumptions between the extreme philosophies of epistemology (Saunders et al., 2009). It can be used as a middle way that utilises the useful characteristics of positivism and interpretivism (Walliman, 2006). More specifically, the current research utilizes prior research and a highly structured methodology to reach the knowledge using a deductive reasoning approach. However, such knowledge is captured only by the social actors (sampling units) and the researcher based on their changeable interpretations and continuous revisions using an inductive reasoning approach (Merriam & Tisdell, 2016). Table 4-1 shows the three studies of the current research in line with the pragmatism philosophy.

Table 4-1, Pragmatism approach adoption in the three research studies.

Study	Text analytics	Exploratory survey	Conclusive survey
Study aim	Understanding the perception of food waste.	Determining the antecedents of the food waste behaviour among Muslim households within Ramadan banquets context.	Measuring the effect of the spiritual effect on food waste behaviour
Related research objectives	<i>Obj1:</i> Explore the general awareness of food waste among households. <i>Obj2:</i> Uncover the role of COVID-19 pandemic on the food waste issue among households.	<i>Obj3:</i> Understand the unique characteristics of the food waste behaviour of Muslim <i>families</i> during seasonal context (e.g., Ramadan month).	<i>Obj4:</i> Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.
Highly structured methodology of positivism assumption	Data collection of tweets, keyword selection, language specification, and time duration with an in-depth investigation.	Semi structured survey with open and open-ended questions to discover the food waste behaviour and its related antecedents.	Structured questionnaire in a cross-culture and cross-country survey to measure the effect of religious commitment on food waste behaviour.
Partial reality of interpretivism assumption	Content analysis and sentiment analysis from the researcher selected keywords, and respondents' limited tweets.	Religious commitment and food waste behaviour are constantly changeable based on many conditions: "the holy month of Ramadan", "Banquets", "social and psychological status", and "unit of analysis".	The direct relationship between religiosity and food waste behaviour can be explained by incorporating other variables.
Social reality knowledge can be constantly developed by interpretations and continuous revisions.	Different techniques of the natural language process, machine learning, keywords, and researcher interpretations develop the knowledge.	Different prioritizing of the reasons for food waste in the Holy month of Ramadan helps in developing knowledge.	Different variables, measurement levels, hypotheses, sampling units, and units of observation help in building knowledge.
Research philosophy	<div style="display: flex; justify-content: space-between; align-items: center;"> Interpretivism Interpretivism-Positivism Positivism </div> <div style="text-align: center; margin-top: 10px;">  </div> <div style="text-align: center; margin-top: 10px;"> Pragmatic researcher approach </div>		

4.2.2 Reasoning approaches (research logic)

Two reasoning approaches are used in scientific research, either inductive or deductive. While the inductive going from the specific to the general (theory development), the deductive going from the general to the specific (theory testing) (Walliman, 2006). For instance, the steps of applying the inductive approach are data collection, using almost qualitative methods, and data analysis to build the theory (Walliman, 2006; Saunders et al., 2009; Bryman, 2012). The main advantages of inductive logic are the deep understanding of the phenomena, less structured methodology, alternative explanations of the data, small sample sizes, data collection where the event occurs, the researcher being part of the research, and less worrying about the generalization (Saunders et al., 2009).

On the contrary, the deductive approach steps are scientifically arranged to test the theory. It starts with formulating the research hypotheses, deciding the operational definitions of the variables, data collection, hypotheses testing, and examining the theory by confirming, rejecting, modifying, limiting, or broadening its application. Figure 4–3 shows the steps of the deductive approach (Bryman, 2012). Hence, the main advantages are explaining the cause-effect relationship, well-defined variables, rigid and highly structured methodology, better applied with quantitative data collection from large sample sizes, generalization can be statistically proved by the large sample size, and the researcher must be independent of the research (Saunders et al., 2009).

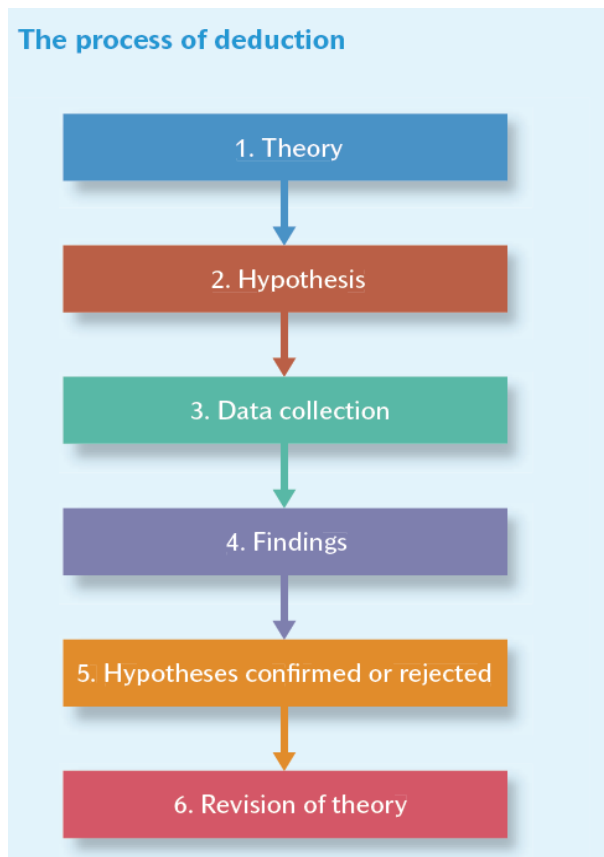


Figure 4–3, Deductive reasoning steps (Bryman, 2012, p. 24)

Although each way of thinking has advantages, shortcomings accompany each one. For instance, the inductive logic interpretivism follower must not generalize unless having a large sample size (sample size), and observations must be repeated across various conditions (replicability). Moreover, the deductive positivistic researcher seeks to test the theory. However, when hypothesis testing reveals the falsifications and true rejection of the theory, a new start of the research must be followed (Walliman, 2006).

To this end, a pragmatism perspective can benefit from both approaches advantages and avoid their disadvantages (Saunders et al., 2009; Merriam & Tisdell, 2016). For instance, while the last step of the deductive approach is theory revision, it involves the induction mindset to infer the results of the deductive approach on the whole theory and, if needed, feeding the theory testing steps. Moreover, as the deductive entails the inductive application, the opposite occurs. In particular, once the data analysis guides the theory building, a researcher may incorporate the deductive logical steps to establish the conditions of the new theory (an iterative process between data and theory) (Bryman, 2012).

This pragmatic application in scientific research is known as the hypothetic-deductive method.

4.2.2.1 Hypothetic-deductive: the underlying logic of the current research:

The hypothetical-deductive reasoning mainly combines the inductive and deductive approaches. For instance, using the inductive approach, the researcher can generate hypotheses to test the theory from the observations. Then, the results can be deducted to revisit the theory by confirming, rejecting, or modifying it. This is also known as the modern method of scientific research. The modern scientific research steps can be summarized as follows (Walliman, 2006):

- 1- Research problem identification. (Inductive)
- 2- Research hypotheses formulation. (Inductive)
- 3- Practical testing of the research hypotheses. (Deductive)
- 4- Maintaining the successful solutions to the research problem. (Deductive)

At this end, it is useful to adopt both interpretivism and positivism using qualitative and quantitative mixed methods.

4.3 Research design

The current research design is developed based on the mixed methods design. Using two qualitative studies and one quantitative study, the current research developed mixed methods in sequential data analysis. This sequential mixed method helped achieve different research objectives by studying different aspects with specific logic. Benefiting from both methods' advantages and avoiding disadvantages, the current research gains rigour (Saunders et al., 2009). More specifically, using a priority-sequence model, qualitative preliminary studies were applied to help and guide the data collection in a principal quantitative study (Morgan, 1998), known as the exploratory mixed method (Merriam & Tisdell, 2016; Creswell & Creswell, 2018). It is worth noting that the current research posits unequal sequential methods, no parallel, and unequal opportunities for preliminary and principal studies (Morgan, 1998) as in table 4-2.

Table 4-2, The three research studies plan

Study	Objectives	Data	Time frame
Study1: Social listening	<p><i>Obj1:</i> Explore the general awareness of food waste among households.</p> <p><i>Obj2:</i> Uncover the role of COVID-19 pandemic on the food waste issue among households.</p>	Published tweets	From 21-6-2020 to 3-8-2020
Study 2: Exploratory survey	<i>Obj3:</i> Understand the unique characteristics of the food waste behaviour of Muslim <i>families</i> during seasonal context (e.g., Ramadan month).	Opened, closed, and open-ended questions answers about the Muslim family food waste Behaviour in Ramadan.	Data collection run after Ramadan 2020 to cover the holy month of Ramadan consumption (from 24-4-2020 to 23-5-2020)
Study 3: Conclusive survey	<i>Obj4:</i> Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan. Also, it provides statistical inference to the generalization of the results.	Closed and open-ended questions answered about the Muslim family food waste Behaviour in Ramadan.	Data collection run after Ramadan 2021 to cover the holy month of Ramadan consumption (from 13-4-2021 to 12-5-2021)

This research, conducted during the holy month of Ramadan, faces challenges in *exploring* food waste among Muslim households without a prior literature review. Therefore, exploratory methods like social listening and surveys are used instead of experimental designs that study cause-effect relationships. This approach is necessary to *uncover the conflict* between social identity and religiosity during Ramadan, a 30-day period.

Experimental studies, such as within-subject designs before, during, and after Ramadan, face complications like manipulation checks, as banquets occur only during Ramadan. Also, the between-subjects design compares control groups (non-banquet hosts) with experimental groups (banquet hosts), which requires understanding the main drivers of food waste behaviour and the conflict between social identity and religiosity first. Finally, factorial or quasi-experimental designs could help establish cause-effect relationships, but these sophisticated designs need theoretical grounding (e.g., through survey results, as done in this conclusive study).

4.4 Data collection

The current research data have been collected through three stages. Each data collection stage was applied to achieve a unique research objective. First, the text analytics of the X data of the tweets in order to understand the food waste perception. Second, the Exploratory survey is conducted in order to determine the context of the phenomena and decide the important predictors of food waste among Muslims. Then, the conclusive survey to measure the direct and indirect effects of the key antecedents of Muslim food waste behaviour in the holy month of Ramadan.

4.4.1 Study 1 – X (previously Twitter)

The internet penetration rate has exceeded half of the world population since 2005, and it will increase, as in figure 4–4, as more aspects of an individual's life become online (Heinonen & Medberg, 2018). This led to the increase of today's internet users to 5.44b with 5.07b of active social media users (Ani Petrosyan, 2024a), even with less engagement (Poole et al., 2024). In this regard, social media helps people to create, connect, and share their content to shape the current world communities. More specifically, social media's contemporary roles in sustainability issues extend to being an educational tool, environmental monitoring and citizen society participation, corporate sustainability empowerment via green marketing strategic instruments, and public discourse platforms that influence decision-makers (Pearson et al., 2016).

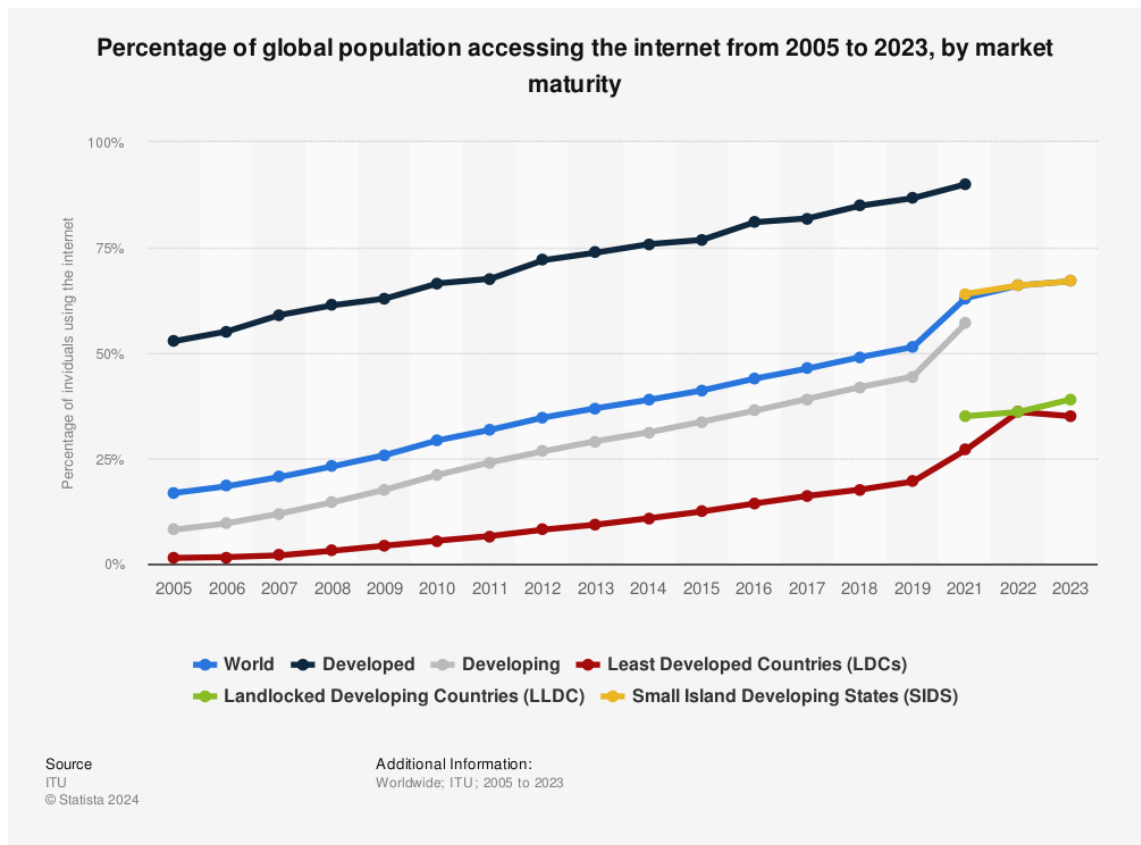


Figure 4–4, World internet access percentage (2005-2021) (Ani Petrosyan, 2024b)

Moreover, due to the COVID-19 outbreak in early 2020 and related peaks, various governments applied different measures from time to time to flatten the disease curve, known as Timed Intervening Policies (TIP) (Prentice et al., 2020). Such measures forced people to stay at home, wear face masks, shop online, and work at home, and social distance that was almost shared between countries changed customer shopping behaviour (more online), product needs, less public product consumption, and less overall satisfaction (Mason et al., 2020). Hence, the rise of the e-commerce shift and social media dependency led to the study of “online” consumer behaviour in marketing research resonance using available social media data (i.e., X data) (Prentice et al., 2020; Guthrie et al., 2021).

To this end, social listening in the current research has been applied with (Reid & Duffy, 2018) to collect the original downloads (tweets) from the publicly available social media platform X (formerly known as Twitter). X is a microblogging platform established in 2004 and allows each user to post tweets, retweet original tweet(s), or reply to a posted tweet(s). A tweet is capped at 280 characters and may contain photos, videos, or URLs (O'leary, 2011;

Bhattacharjya et al., 2016). Therefore, in such an observational study (Janta, 2018), the “passive” researcher did not interact with the tweets to underpin the consumption and anti-consumption conflict experiences (Heinonen & Medberg, 2018) about the food waste behaviour.

4.4.1.1 Study setting

The current sampling unit (participant) was any individual who uses X, and his/her tweets include the keywords. In this regard, X allows different units of observations (publicly online tweets) based on target users (i.e., Trump; Elon Musk), Keywords, or Hashtags. Moreover, the unit of observation for the current study was the tweet itself based on the keyword and hashtag in a topic-based non-probability sample (Etter et al., 2018), known as the text-based document (Creswell & Creswell, 2018). Merriam & Tisdell, (2016, p.162) defined the document as an “umbrella term to refer to the wide range of written, visual, digital, and physical material relevant to the study”.

Since such documents have been produced for non-research purposes, the tokenization (Merriam & Tisdell, 2016) used in the study could provide some insights into the research phenomenon. In this regard, extracting tweets can be done using paid service, data crawlers, or an Application Programming Interface (API). The API is a regulated software by platform owners to decide the accessible information levels (Etter et al., 2018).

In this study, data were collected using Twitter API v1.1. This version of the API offered various endpoints for accessing X data, including the Streaming API and the Search API. The Streaming API provided a real-time sample of public tweets, capturing approximately 1% of the total tweet volume at any given time. This sampling method ensures a manageable yet representative dataset for analysis.

Furthermore, the Standard Search API v1.1 was employed to retrieve tweets from the past seven days. This API allows for up to 18,000 tweets per 15-minute window, which is a rate limit imposed by X to ensure fair use of their resources. By adhering to these rate limits, it was ensured that the data collection was within the bounds of X's usage policies. The first approach of using Search

APIs provided a comprehensive and daily updated dataset for analysis in the current research.

More specifically, using the free standard Search API v1.1, the extracted tweets were carefully selected by including a Keyword of “Food Waste” or a hashtag of “#foodwaste” (*query = Food waste OR #foodwaste*). Also, the token excluded all the retweets to ensure each extracted tweet is original. All extracted tweets were only in the English language to facilitate the analysis. The main focus was on the recent tweets during each week of the available public tweets, as this is the limitation of the free API (Chae, 2015; Shaw, 2021).

This topic-based search approach has been applied in previous research to conceptualise panic buying among consumers in the UK during COVID-19 pandemic, using full archive API. A content analysis and cluster analysis revealed that Panic buying is a sudden and intense desire to stockpile goods, leading to increased food waste and a surge in home cooking (Zaky et al., 2022). Similarly, Jenkins et al. (2023) applied sentiment analysis on topic analysis of food waste to explore the priority areas of campaigns and interventions among Australian households during COVID-19, using advanced search API. The main sentiment was “anger” which was attached to the main topics of food waste, namely, “Eating to save food waste”, “Supply chain food waste”, “Food waste morals”, and “Food waste research”. Accordingly, a total of 42552 random extracted tweets were collected on a daily basis from 21-6-2020 to 3-8-2020, as in figure 4–5.

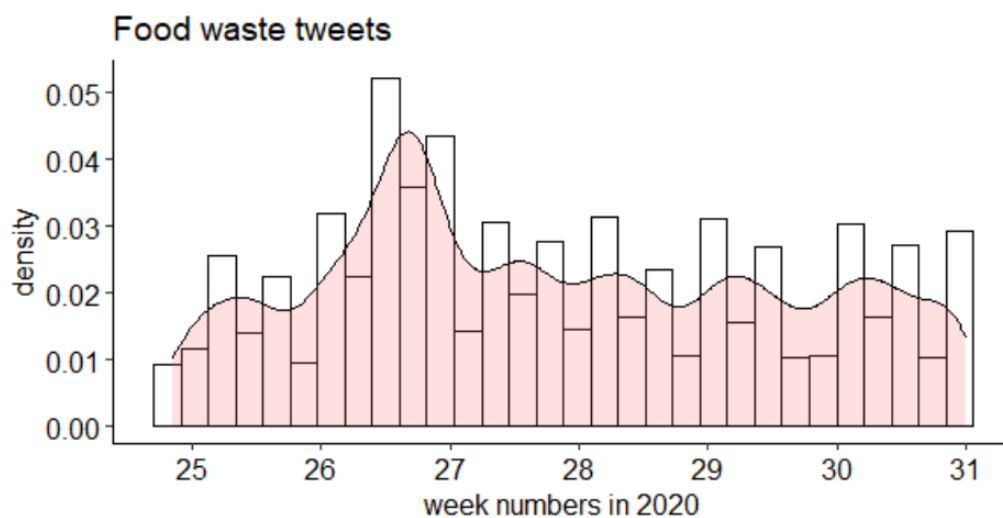


Figure 4–5, Extracted tweets distribution across the data collection period.

To this end, each extracted tweet included the tweet text, screen name, posting date, retweet status, and extraction date and time. To establish the anonymous ethical requirement, each extracted tweet in the metadata was given a unique identification number, and then all the ID, posting date, tweet text, and extraction date were saved in a new data file for data cleaning and analysis purposes. A sample from the tweets are shown in table 4-3.

Table 4-3, 10 examples of the extracted tweets

Tweet ID	Tweet text
1	This heartbreaking. Children should not be waste of food...
1501	We have been trying food waste and eating more healthily,I fruit bags very ha...
2901	A designer food waste 3D printed
5182	[send our food waste throwing away a build soil.
6042	He wants to want to waste ??????... food
6048	Safe food waste go careful with ens...
11609	Proper storage food outbreaks waste, pro...
14648	Best Before food that would have waste # #

4.4.1.2 Rationale behind X-data social listening

Like ethnography, social listening involves monitoring social media data to understand customers' views about sensitive (ethical) topics (i.e., responsible consumption and food-wasting behaviour). It is a flexible and adaptable method with social listening practices (Reid & Duffy, 2018) that can be compatible with other research methods (e.g., surveys). Moreover, it is faster, simpler, and cheaper than the traditional ethnography (Heinonen & Medberg, 2018), especially within the COVID-19 outbreak. In addition, unlike interviews and observations, the document data of the tweets provide the stability to be replicable independently from the researcher's participation (Merriam & Tisdell, 2016). Therefore, this first study is applied to achieve the first two research

objectives: *Obj1*: Explore the general awareness of food waste among households, and *Obj2*: Uncover the role of COVID-19 pandemic on the food waste issue among households.

Yet, it is important to mention that the authenticity of the tweet is questionable (Heinonen & Medberg, 2018) since users may have multiple personas that differ from online virtual settings to offline real-life posts (Merriam & Tisdell, 2016), this is supported by the attitude-behaviour gap, too, which is confirmed in ethical situations (Sudbury-Riley & Kohlbacher, 2016). However, some provided personal information to users (Merriam & Tisdell, 2016) to confirm their identity, adding an authentic layer to their tweets. For instance, each extracted tweet included the author's name, posting data, retweet status, and extraction date. Moreover, the data quality may also be problematic since the original tweets were posted for non-research objectives, which may include non-consensus in observations (Heinonen & Medberg, 2018), or fragmented (Merriam & Tisdell, 2016). A large size of the sample with data cleaning will produce high-quality tweets with a reasonable sample size. All ethical concerns are considered in Appendix (A).

Moreover, besides tweet authenticity questionable, the English language is another limitation for Muslim-dominated communities who usually consider English as a second language. To this end, it is worth noting that due to the limitations of social listening of X, the current study falls short of achieving the other two research objectives; *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month), and *Obj4*: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan. Therefore, the results of the X data analysis will be used in parallel to the exploratory survey with inductive reasoning and adopting social constructionism (ontology position) and interpretivism (epistemological position) as preliminary studies to the principle conclusive survey.

4.4.2 Study 2 - Exploratory survey

A critical review of the literature reveals a significant research gap in the study of food waste, particularly regarding the unit of analysis. Most existing research, which is largely customer-perspective-oriented, has focused on food waste from the individual's point of view (Diaz-Ruiz et al., 2018; Abiad & Meho, 2018; Abdelradi, 2018). This narrow focus fails to capture the broader context of food waste within households, which are identified as the largest contributors, accounting for up to 70% of food waste in well-developed countries like the UK (Annie Reid, 2021). Given this substantial contribution, it is crucial to expand the unit of analysis from individuals to households. Studying the household as a collective unit rather than isolating individual members will provide a more comprehensive understanding of food waste behaviours and enable the development of more effective mitigation strategies.

4.4.2.1 Rationale

Among the key drivers of food waste behaviour is the religious commitment and materialism (Diaz-Ruiz et al., 2018; Abiad & Meho, 2018; Abdelradi, 2018). Hence, there is a need to study food waste behaviour within a specific religion (i.e., Islam). In addition, various family compositions in Islam have at least married, married with children, widowed, and divorced women's marital status. Hence, the woman in a Muslim family can be considered as the current unit of observation to be incorporated in a survey directed to the family unit of analysis. Finally, seasonal food waste has been claimed in events and gatherings (Wang, L. et al., 2017). Hence, there is a need to study food waste in the Holy month of Ramadan (Abiad & Meho, 2018).

To this end, the current exploratory survey is applied to achieve the third research objective: *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month). Moreover, due to COVID-19 restrictions in 2020, the current study applies a cross-sectional descriptive survey using a semi-structured questionnaire (Malhotra & Dash, 2016). However, as the current research focuses on the group consumption behaviour of Muslim families, it is challenging to collect semi-structured questionnaires from families with various compositions as sampling units, while the woman, as a unit of observation, has the required information

about her family. Therefore, it is important to mention the household roles in the Islamic religion. However, it is worth confirming that the exploratory study using a semi-structured survey cannot be used to establish a cause-effect relationship, nor generalize the results. In addition, the results of the exploratory survey should be merged with the insights from X data analysis to clarify the specific reasons for food waste behaviour. After that, a conclusive survey is applied to achieve the last objective: *Obj4*: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.

4.4.2.2 Study context: Household roles in the Islam religion

As food waste in households is intensively studied at the individual level, a significant proportion of the food waste is generated from the household. However, very little is known about the family's food waste behaviour due to the constraints of surveying the whole family.

However, in the Muslim community, where there is no way to be in partnership with the other gender except by marriage, families can be easily constructed, and legal children can be easily identified, as this is the only way to contact another gender. God says in the holy book of Islam, “*And do not approach unlawful sexual intercourse. Indeed, it is ever an immorality and is evil as a way*” (Qur'an 17, 32), and “*Say to the believers they should lower their gaze and guard their private parts that is purer for them. Allah is Aware of the things they do*”. (Qur'an 24:30).

To this end, religion, as a vital dimension of culture, forms our lives. It also provides a framework for a source of meaning to facilitate our understanding of life practices. On a larger scale, it serves the society. A religious committed small society of households that consists of husband and wife has a strong influence on the whole family commitment progress (Delener, 1994). In this vein, studying the whole household's behaviour instead of everyone's actions is much needed to study the collective behaviour of the whole group in the house.

Moreover, in the Islamic religion, the woman is much appreciated for her multifaced roles. She is the sole love, wife, daughter, mother, and housekeeper. In her house, men are ordered to treat their women as queens with the most

preferable good deeds. In general, the God says, *"O you who believe! It is not lawful for you to inherit women against their will. And do not coerce them to take away some of what you had given them—unless they commit a proven adultery. And live with them in kindness. If you happen to dislike them, it may be that you dislike something in which Allah has placed much good"* (Qur'an 4, 19), and the Muslim prophet (PBUH) said, *"The whole world is to be enjoyed, but the best thing in the world is a good woman"* (Sunnah, Mishkat al-Masabih 3083).

Moreover, the prophet (PBUH) said, *"Whoever has three daughters and is patient towards them, and feeds them, gives them to drink, and clothes them from his wealth; they will be a shield for him from the Fire on the Day of Resurrection."* (Sunnah, Sunan Ibn Majah 3669). Which encourages fathers to love and adore their daughters (s). In addition, a mother's role is much appreciated in Islam. It was narrated from Mu'awiyah bin Jahimah As-Sulami, that Jahimah came to the prophet (PBUH) and said, *"O Messenger of Allah! I want to go out and fight (in Jihad), and I have come to ask your advice." He said: "Do you have a mother?" He said: "Yes." He said: "Then stay with her, for Paradise is beneath her feet."* (Sunnah, Sunan an-Nasa'i 3104). Similarly, a person came to the prophet of Islam (PBUH) and asked, *"Allah's Messenger, who amongst the people is most deserving of my good treatment? He said: Your mother, again your mother, again your mother, then your father, then your nearest relatives according to the order (of nearness)."* (Sunnah, Sahih Muslim 2548b).

However, comparing various religions according to each one of these roles is out of the current research scope. Hence, providing the Islamic context according to these roles will benefit studying the woman as the unit of observation to analyse her family level. In addition, the family's different responses to the roles depend on many factors, such as their religiosity and commitment level. In this regard, while some roles can be male-dominated or jointly performed, such as providing income or teaching and disciplining the children, housekeeping is clearly female-dominated (Bahr, 1982) especially in the Muslim community. In this regard, God says: "Men are the protectors and maintainers of women because Allah has given the one more (strength) than the other, and because they support them from their means. Therefore, the righteous women are devoutly obedient and guard in (the husband's) absence what Allah would have

them guard [...] (Qur'an surah 4:34). Also, the Islamic prophet (PBUH) said, "All of you are guardians and are responsible for your subjects. The ruler is a guardian of his subjects, the man is a guardian of his family, the woman is a guardian and is responsible for her husband's house and his offspring, and so all of you are guardians and are responsible for your subjects." [Al-Bukhari and Muslim]. Hence, studying the Muslim household by surveying the women who are responsible for housekeeping sounds appropriate.

4.4.2.3 Study instrument

The semi structured questionnaire was used as the survey instrument using a mix of closed, open, and open-ended questions. As in Appendix (B), the questionnaire consent was first introduced. It also included questions related to the woman and family demographics, household chores, women's eating style, Islamic teaching related to eating and food waste, food waste categorization, reasons behind wasting food in the holy month of Ramadan, COVID-19 impact, and food waste management.

4.4.2.4 Pre-testing

Four female experts, two Muslims and two non-Muslims, reviewed the initial draft and provided recommendations to enhance the wording and clarity of questions and their order in the questionnaire. For example, "The discount is on high volume units; hence, I buy more than I need" has been clarified based on the reviewers' recommendations to "I buy more than I need due to the discount".

4.4.2.5 Translation

Moreover, the questionnaire was translated and back-translated from English to Arabic language by the researcher and two of his colleagues as they all, were native speakers of Arabic, Muslims, marketing researchers, and have academic English knowledge.

4.4.2.6 Study setting

Using the JISC online platform, the current questionnaire has been distributed to the Woman "who is responsible for preparing food for her Muslim family". The survey was in English (43 questionnaires) and Arabic language (261 questionnaires). All ethical concerns are considered in Appendix (A). Data collection covered the holy month of Ramadan 2020 (from 24-4-2020 to 23-5-

2020) as in figure 4–6. This helped in capturing the woman's experience of the whole month.

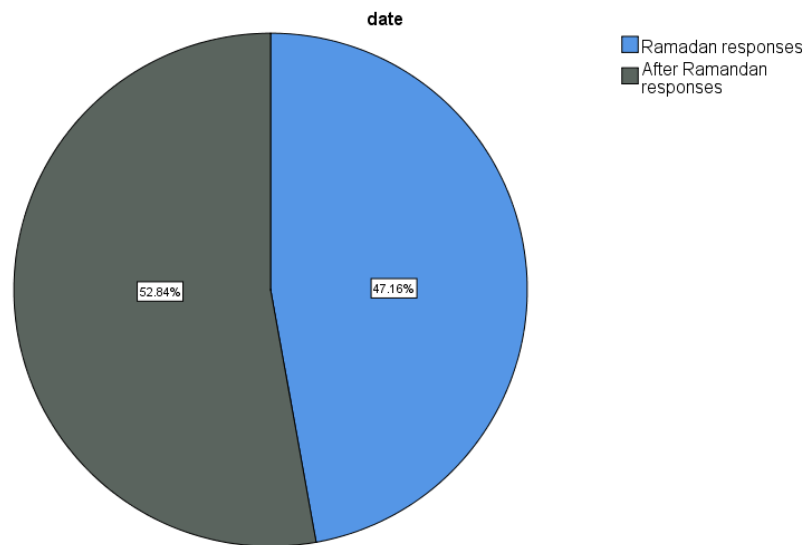


Figure 4–6, Exploratory survey responses during and after the holy month of Ramadan.

To this end, it is important to note that the exploratory study using a semi-structured survey cannot establish cause-effect relationships or generalize the results. Additionally, the findings from the exploratory survey will be combined with insights from X data analysis to identify the specific reasons behind food waste behaviour. Following this, a conclusive survey is conducted to achieve the final objective: *Obj4*, which is to measure the impact of social and psychological factors on food waste behaviour among Muslim families during Ramadan.

4.4.3 Study 3 - Conclusive survey

A year after the first holy month of Ramadan during COVID-19 pandemic, the vaccine and measures were partially in place in 2021. This resulted in slightly relaxing some strict measures in a few countries with various degrees. Hence, the main attributes of the food waste behaviour context among Muslim families can be extended to the principle quantitative survey.

4.4.3.1 Rationale behind the conclusive survey

At this point, the current study benefits from the results of the two studies of the exploratory research. Therefore, it is applied to test the cause-effect relationships

among the study variables that have been investigated by the exploratory research with two studies to achieve the last research objective: *Obj4*: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.

By incorporating all variables in one instrument and collecting the data in a specific period, the other variables' effects can be partially controlled (Saunders et al., 2009). Hence, there was a need to collect the study variables' data through a structured questionnaire in a single cross-sectional conclusive survey (Malhotra & Dash, 2016). However, it is worth noting that studying the cause-effect relationship using experimental study is more accurate (Malhotra & Dash, 2016).

Moreover, to enhance the accuracy of measuring the well-defined variables, multi-item scales can safely be utilized in one questionnaire. This, in turn, ensures the validity and reliability establishment. A questionnaire can easily hold all the measurement items. Hence, there was a need to measure the study variables in one questionnaire.

Finally, the conclusive survey results can be statistically generalized across all homogenous population units. For instance, studying Muslims' religious teachings and commitment to their food waste behaviour requires data from various countries, cultures, family compositions, marital status, and other demographical variables. A conclusive survey can collect data from various distinct observation units at the same time in a single cross-sectional design (Malhotra & Dash, 2016).

4.4.3.2 Study instrument

The structured questionnaire included consent information about the researcher's details, approximated filling time, survey aim, privacy protection, and right to withdraw (Saunders et al., 2009) as in the ethical plan in Appendix (C). It included questions about the demographical factors of the respondent and her family, as in Appendix (D), which will be used as control variables in the analysis. This survey also included the measurement items of the study variables in the conceptual model, as in table 4-4.

Table 4-4, Conclusive survey measurement items.

Variable/dimensions		Measurement items	Applied scale
Food waste behaviour		It has passed the best-before stamped date.	Statement: from 1=Too little to 5=Too much (Diaz-Ruiz, Costa-Font, & Gil, 2018)
		It has been damaged or moulded (e.g., the stale bread stored in the fridge or cupboards).	
		I had leftovers and I had not used for another meal.	
		I cooked more than I needed, and I have not used it for another meal.	
Religiosity effect		Religious beliefs influence all my behaviours in life.	Statement from 1=strongly disagree to 5=strongly agree (Worthington Jr et al., 2003)
		My religious beliefs lie behind my whole approach to life including how I consume and store food.	
		Religion doesn't promote for excessive consumption of food.	
		I enjoy socialising with other Muslims over food and drink.	
		I donate food to charities and religious organizations.	
		A religious person balances between food, drink and him/herself needs.	
		A religious person doesn't consume food excessively.	
Materialism	Success	I admire people who own expensive homes, cars, and clothes.	Statement from 1=strongly disagree to 5=strongly agree (Richins, 2004)
		The things I own say a lot about how well I'm doing in life.	
		I like to own things that impress people.	
	Centrality	I try to keep my life simple in regard to possessions. (R)	
		Buying things gives me a lot of pleasure.	
		I like to have a lot of luxurious items in my life.	
	Happiness	My life would be better if I owned certain things I don't have.	
		I'd be happier if I could afford to buy more things.	

Variable/dimensions		Measurement items	Applied scale
		Sometimes, it bothers me quite a bit that I can't afford to buy all the things I'd like.	
Loneliness feeling:	Social loneliness	There are plenty of people I can rely on when I have problems. (R)	Statement from 1=strongly disagree to 5=strongly agree (de Jong-Gierveld, 1989; Rippé et al., 2018)
		There are many people I can trust completely. (R)	
		There are enough people I feel close to. (R)	
	Emotional loneliness	I experience a general sense of emptiness.	
		I miss having people around.	
		I often feel rejected.	

(R) reversed item.

4.4.3.3 Common method bias

Since all the measurement items have been embedded in one instrument to be collected at one time from one respondent, the shared variance between the measurement items could possibly occur (Podsakoff et al., 2003; Jordan & Troth, 2020). Therefore, to mitigate the common method bias, some procedural remedies have been incorporated, such as psychological and methodological separators. Instead of reading a fake story between the independent and dependent variables in the questionnaire (Podsakoff et al., 2003), respondents were asked to remember and write where they spent their last vacation. Then answer one open-ended question, "To what extent did you experience this vacation?" by ticking all available answers as follows:

- ☐ I enjoyed it a lot and was very happy.
- ☐ I had better sleep.
- ☐ I loved the sea
- ☐ I liked the socialization.
- ☐ Other, please specify.....

Moreover, the research purpose and instructions are given to the respondents. In addition, any ambiguous items have been rephrased to increase the items clarity. Additionally, some scales' anchors have been altered to reduce the likelihood that thoughts triggered in answering one question will be recalled

before answering the following one. Also, some reversed items have been included to break the developed pattern by the CMB. Figure 4–7 summarizes the procedural remedies used in the current research.

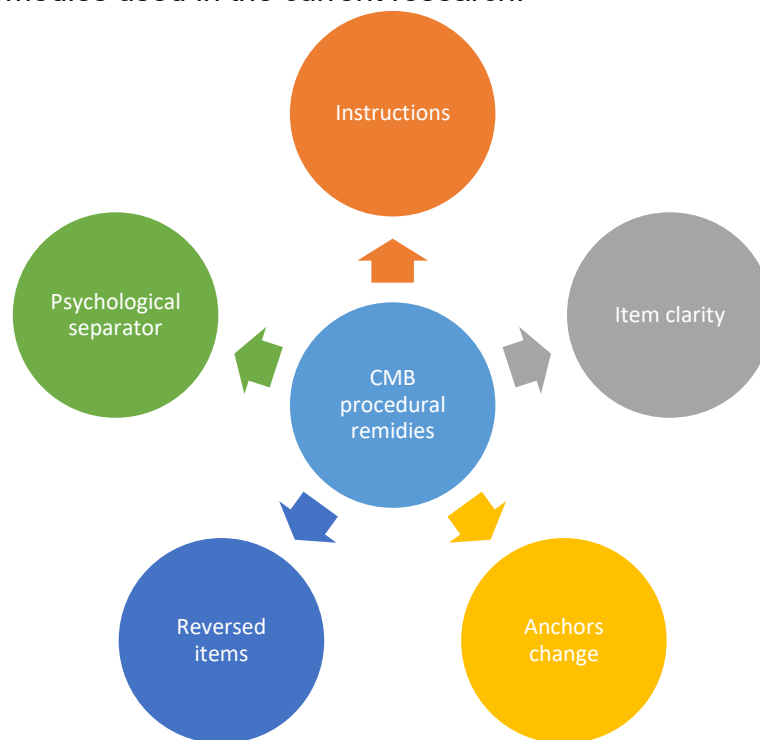


Figure 4–7, Procedural remedies of CMB

Apart from the above, the statistical “post-data collection” remedies will be applied to minimize the Common Method Bias by applying Harman’s single-factor test (Podsakoff et al., 2003) and Full collinearity assessment in the Structural Equation Modelling (Kock, 2015).

4.4.3.4 Pre-testing

Four female experts, two Muslims and two non-Muslims, reviewed the initial draft and provided recommendations to enhance the content validity. In doing so, the unnecessary questions were removed, and the clarity of remained questions, and their order in the questionnaire were improved. Moreover, the questionnaire was translated and back-translated from English to Arabic language by the researcher and three of his colleagues as they all, were native speakers of Arabic, Muslims, marketing researchers (except one was in the Human Resource discipline) and had academic English knowledge.

4.4.3.5 Study setting

The conclusive survey questionnaire was distributed to the same observational unit as in the exploratory research using the JISC data collection online platform. This means that the respondents in the exploratory research are not necessarily incorporated into the conclusive research. A total of 600 valid questionnaires, 503 in Arabic and 97 in English language versions, were collected from May to July, which directly followed the holy month of Ramadan 2021 (from 13-4-2021 to 12-5-2021) to reflect the whole month's experience. To encourage the observational units, a total of \$250 incentives were announced to be given to 5 random respondents with only valid questionnaires.

4.5 Ethical considerations

As the current research is applied through three studies, each study has specific potential ethical issues that should be revealed. The X metadata of the first study included tweets in the English language from users all over the world. Therefore, the usernames, and posting time and date were removed from the dataset before the analysis. Also, each tweet had a unique identification number instead of the username. Moreover, to ensure the confidentiality and privacy of the X users (Merriam & Tisdell, 2016; Creswell & Creswell, 2018; Heinonen & Medberg, 2018), each tweet has been reported in the current research with removed words that hinder retrieving the user details. All the retrieved data and cleaned data were saved into the University of Hull one drive folder that is shared between the researcher and the university.

Moreover, the second and third studies applied single cross-sectional surveys from Muslim women about their families. Hence, the consent form for each questionnaire was confirmed before answering the questionnaire. Such a consent letter included the researcher's name, research aim, needed time to answer the questionnaire, the right to withdraw at any time, privacy protection by anonymity, and the researcher's contact. The two surveys were applied using the JISC platform, which is moderated by the University of Hull, to give the researcher the required access.

Finally, the monetary incentives that were announced in the third survey were carefully planned by the researcher. For instance, giving one huge prize (\$250) to a randomly selected valid questionnaire may deceive the respondents instead of encouraging them to complete their answers. Also, dividing the \$250 into very small amounts might send the wrong signals to respondents from the cost/benefit perspective. Therefore, selecting 5 random respondents was appropriate to increase the response rate as each winner will have \$50, and each one expected his/her winning probability to be doubled five times. To this end, after data cleaning, the valid responses were pooled for a random selection order in SPSS, and the winners were identified by their unique IDs, which were used to reach the winner's contacts from the original raw data. The researcher paid for the prizes from his own budget.

4.6 Proposed statistical analysis plan

The statistical analysis plan for the three studies can be viewed in figure 4–8. It begins with the X data analysis by adopting text analytics methods such as Data cleaning, quantitative content analysis, Sentiment analysis via a Lexicon-based approach, and social network analysis in order to achieve the first two objectives: *Obj1*: Explore the general awareness of food waste among households, and *Obj2*: Uncover the role of COVID-19 pandemic on the food waste issue among households. Moreover, the second study analysis steps are data cleaning, frequencies, and comparative analysis with a series of *t*-tests, to achieve the third objective: *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month). Finally, the conclusive study data analysis begins with the sample distribution, data quality, common method bias checks, and structural equation modelling to test the direct and indirect hypotheses in order to achieve the last research objective: *Obj4*: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.

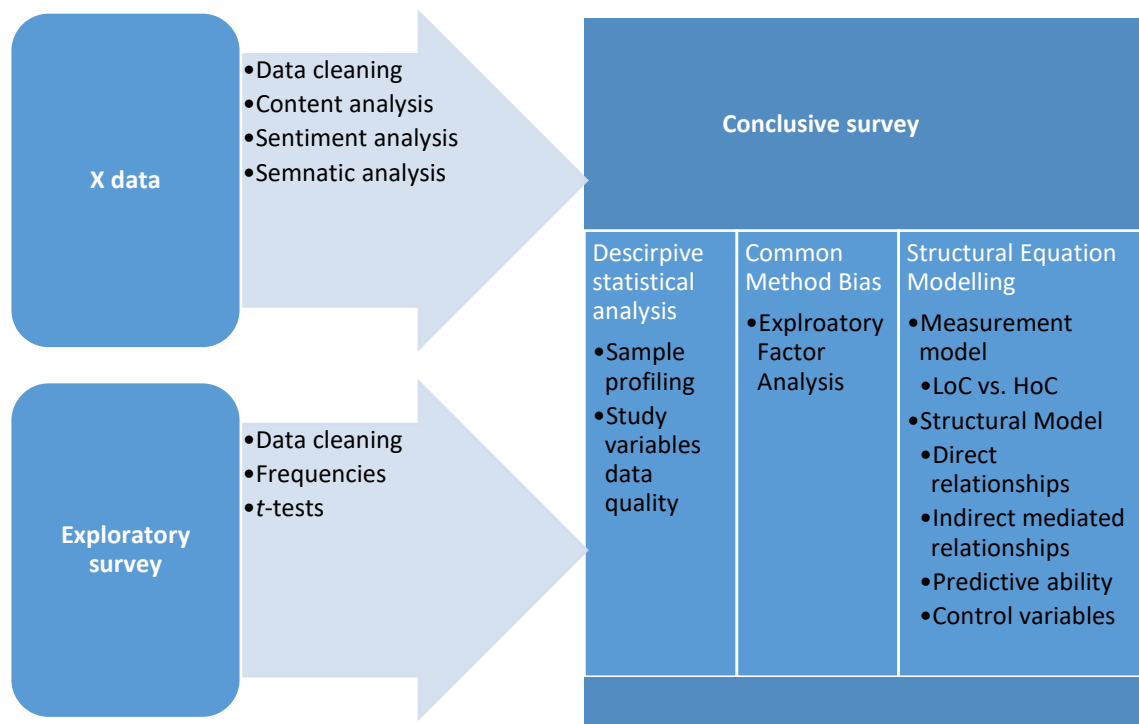


Figure 4–8, Statistical analysis plan.

4.7 Chapter summary

This chapter presented the foundational paradigms, philosophies, and logic underpinning the current research. It outlined the mixed-methods research design, which encompassed three studies: X data analysis, exploratory surveys, and conclusive surveys. Ethical considerations regarding data collection were addressed prior to proposing a statistical analysis plan. The following chapter will illustrate the statistical data analysis process for each of these three studies in detail.

Chapter 5 Data analysis and results

“The goal is to run data into information, and information into insights”

Carly Fiorina, the CEO of HP from 1999 to 2005

5.1 Introduction

This chapter explains the detailed statistical data analysis and results of the three studies. It begins with applying the data mining approach with machine learning models of the tweets. Using text analytics, a data cleaning process is applied to the tweets before running the content, sentiment, and semantic analysis. Then, the quantitative statistical analysis is applied to the exploratory survey using descriptive and inferential comparative techniques. Lastly, the conclusive survey is analysed using descriptive and inferential data analysis to test the proposed relationships in the conceptual model. Figure 5–1 summarizes the chapter content.

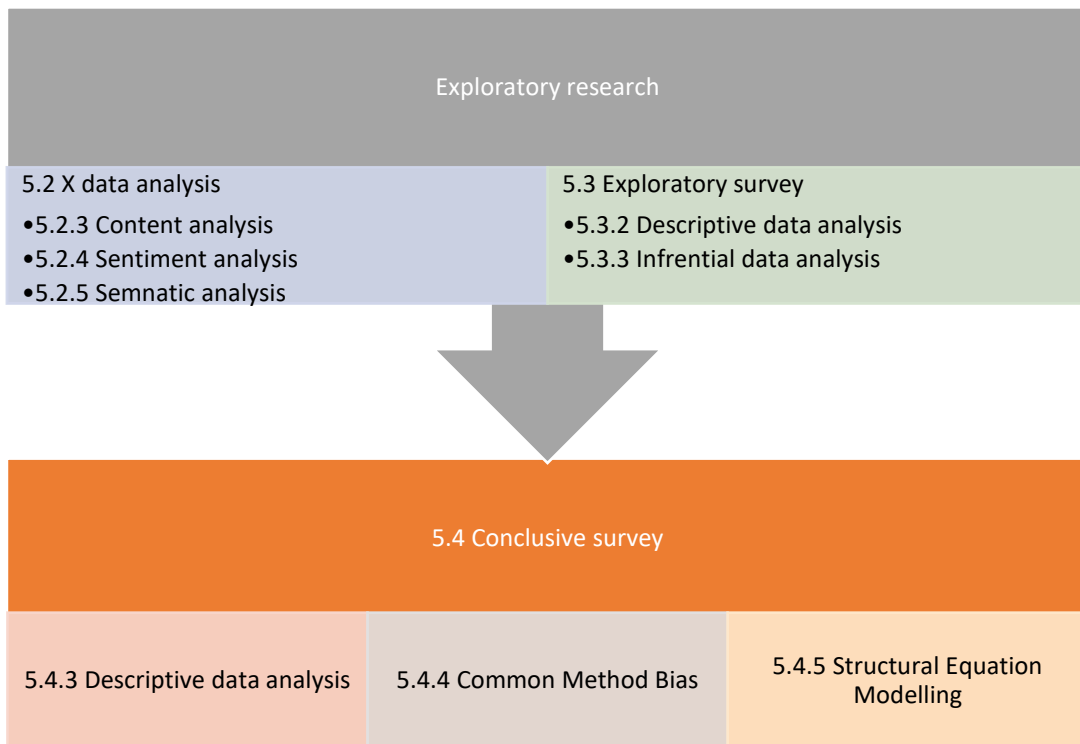


Figure 5–1, Data analysis chapter map

5.2 Text analytics of the tweets

Although X offers very insightful tweets related to any topical phenomenon, it provides them in a metadata form. Such metadata includes irrelevant information. Therefore, the pre-processing stage is applied first to the extracted metadata to filter out the invalid information before running the data. After that, the relevant tweets are cleaned before extracting the tweet's features in content analysis. To this end, the obtained sentiment scores for each tweet are averaged to judge the tweet sentiment (i.e., positive, negative, or neutral). Each cluster of positive tweets or negative tweets is incorporated in the semantic network analysis to figure out the nodes and edges (topics), as in figure 5–2.

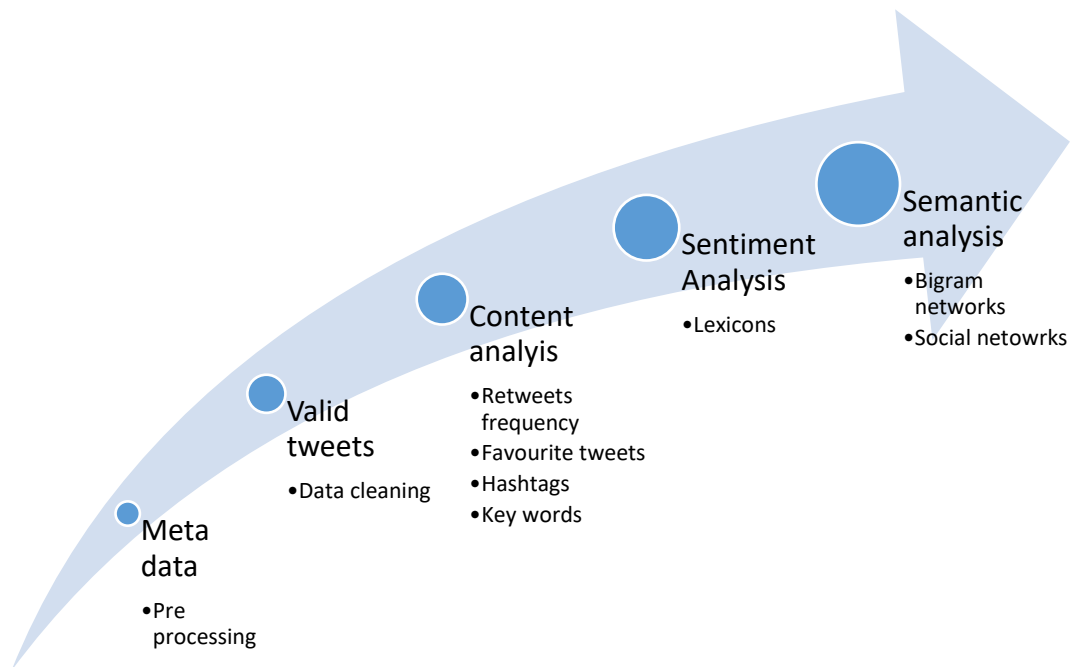


Figure 5–2, Text mining process

5.2.1 Metadata pre-processing

The data pre-processing started with checking the *duplicated* tweets as some users copy and paste others' tweets. In this regard, it is important to note that the current dataset contains 280 duplicated tweets. To ensure data accuracy and eliminate redundancy, these duplicated tweets have been successfully removed. This leaves 42272 unique tweets for the analysis. Moreover, due to the free API limitations, *incomplete* tweets generate URL links to the whole tweet. The missing parts are either text or any other attachment to the tweet (i.e., picture, video, links to news or articles (Chae, 2015). Hence, there is a need to exclude these links (e.g., the URL (http) first and the text after it) to keep only the meaningful textual content (AlShehhi et al., 2019), then rechecking the duplication among the complete extracted parts.

To this end, *rechecking the duplication* revealed 4070 duplicated tweets after removing the URL from the tweets. This means, 4070 tweets used the same text with different attachments. Hence, the unique tweets were reduced to 38202. After that, 23814 incomplete/truncated tweets that end in ellipsis like this ... *three dots* were removed. This leaves only 14388 complete tweets.

Removing incomplete tweets:

Before: [1] "\"You in front of
me didn't waste food. hand on his bac...
https://t.co/ GSU"

After: [1] "\"You in front of
me didn't waste food. hand on his bac..."

5.2.2 Data cleaning

A total of 14388 complete tweets are exposed to the intensive cleaning process. There are no optimal steps to clean the tweets, hence text mining and machine learning algorithms can be selectively considered to structure the informal text (Chae, 2015). Accordingly, *mentions*, *tags*, and *usernames* that come after the @ sign were removed from the text.

Removing tags:

Before: [1] "@ @ r @ otu Thinking of stopping
food at this point, be 18."
After: [1] " Thinking of stopping food at this point,
be 18."

Then, all *hashtags* that are the text after the # sign were excluded in a new column. This leaves the text without hashtags.

Excluding hashtags from tweets:

Before: [1] "Ginger food. Make
teaspoon! #stopfoodwaste #valuefood"
Excluded hashtags: [1] "c(\"#stopfoodwaste\", \"#valuefood\")"
After: [1] "Ginger food. Make
teaspoon! "

After that, all *emojis* that have been retrieved in UTF-8 unicode were transformed into their emoji symbols.

Emojis transformation:

Before: [1] "I bird <U+0001F644> waste "
After: [1] "I bird 🐦 waste "

Then, all *emoticons*' symbols have been replaced with their text using hash emoticons lexicon in text clean package.

<i>Emoticons transformation:</i>	
Before: [1] "Awesome Worth downloading! :-)"	share food
After: [1] "Awesome Worth downloading! smiley "	share food

Since the spaces can be transformed in the emoticons, all *unnecessary generated spaces* are removed after transforming the emoticons into their text. In this regard, the blank spaces at the beginning and at the end tabs are removed.

<i>Removing blank spaces:</i>	
Before: [1] " fast food worker him ? the immeasurable"	on
After: [1] " fast food worker immeasurable"	on him ?

After that, all the *punctuations* were removed from the text.

<i>Removing punctuations :</i>	
Before: [1] "The \"5 Agriculture food waste"	\" is a myth
After: [1] "The 5 Agriculture food waste"	is a myth

In addition, all text letters were transformed into the lowercases version.

Lowercase formatting:

Before: [1] " WASTE FOOD "

After: [1] " waste food "

Additionally, all the cleaned data in lowercase text were transformed into corpus documents. After that, all *stop words* were removed based on the English dictionary.

Removing stop words:

Before: [1] " the way to go and in great food waste that"

After: [1] way go great food waste "

Similarly, before analysing the hashtags, a transformation process was applied to clean the words.

Hashtag cleaning:

Before: [1] "c(\">#ParanoiaAgent\", \">#Toonami\")"

After: [1] "ParanoiaAgent Toonami"

To this end, a total of 7858 hashtags were obtained from the 14388 valid tweets. It is worth mentioning that not each tweet used hashtags as some used multiple hashtags.

5.2.3 Content analysis

The content analysis is exploratory in process and predictive or inferential in intent. It is indeed beyond the traditional content, symbols, and intentions. Most importantly, the contemporary content analyst must develop his/her own

methodology (Krippendorff, 2018). To this end, the current content analysis includes feature extraction using descriptive statistics, hashtags, and keywords (Mishra & Singh, 2018). To this end, table 5-1 shows the most retweeted “original and unique in the data set” tweets over 100. Also, the most favourite tweets over 500 times are in table 5-2.

Table 5-1, Most frequently retweeted tweets

Unique.ID	Original text before cleaning	Retweet count
16348	The culture of food waste cease to disgust me https://t.co/	10599
24065	https://t.co/ no food go to waste house	596
29922	Living alone waste food. sell half loaves?	367
29274	solution food pack waste . https://t.co/	304
6703	Reasons #COVID19 #coronavirus. <U+0001F4D5> Read more about fighting food waste: https://t.co/ https://t.co/	197
13653	@ food waste trend .. https://t.co/	183
40410	2.4 Million Pounds Waste, Gets Food Banks https://t.co/	153
42347	ugly plants a chance. <U+0001F4D5> Read more: https://t.co/	147
15605	#potatoes poor people world? waste food sinful! #COVID19 https://t.co/	105

As can be seen from table 5-1 and table 5-2, the most retweeted and favourite text is “*The culture of food waste cease to disgust me <https://t.co/>*”. This reflects to what extent people believe that food waste behaviour is an unacceptable phenomenon as they feel disgusted about it. Similarly, the second most frequently retweeted text (the 5th favourite tweet) is “*<https://t.co/> no food go to waste house <https://t.co/>*”. It clearly confirms people's determination to stop the food waste in their houses. Therefore, studying food waste behaviour can be insightful if it is directed to the houses, families, and household context rather than the individual's takeaway wasting behaviour.

More specifically, the third most frequently retweeted and favourite text is “*Living alone waste food. sell half loaves?*”. This means the consumer's feelings of loneliness and social isolation increase the food waste in any way. Moreover, another important and relevant insight is very timely and relevant to the COVID-19 pandemic when its outbreak was in early 2020, and its related measures started after that. Among these measures were “stay in home” and “social distancing” before enforcing them in the lockdown act. In that time, people were forced to stay isolated from their friends and extended families. Hence, they faced a sense of depression and loneliness. Therefore, another most frequently retweeted text was “*Reasons #COVID19 #coronavirus. <U+0001F4D5> Read more about fighting food waste: <https://t.co/>*”. That highlights the significance of combating such wasteful behaviour and emphasizes the importance of addressing it effectively.

Nonetheless, all other most frequently retweeted texts reflect the tactics and strategies to reduce the actual wasting behaviour (i.e., food waste management practices). Moreover, most of the other favourite retweets reflect the food waste monetary value.

Table 5-2, Most favourite tweets over 500 times.

Unique.ID	text	Favourite count
16348	The culture of food waste cease to disgust me https://t.co/	14443
13653	@ food waste trend .. https://t.co/	3848
29922	Living alone waste food. sell half loaves?	2979
8664	@ @ @ Why do that, thousands dollar waste? weird you.	2939
24065	no food go to waste house https://t.co/	1967
12475	@ @ @ @ most of food waste person, out. capitalism	833
18503	money like two large pizza eat.. waste	730

Unique.ID	text	Favourite count
29274	solution food pack waste . https://t.co/	691
40814	@ Don't food waste take out to you. <U+0001F602><U+0001F923>	552
40410	2.4 Million Pounds Waste, Gets Food Banks https://t.co/	545
35349	@ waste food <U+0001F602>	544
29304	food waste restaurants breeding grounds <U+0001F914>	514

Apart from this, the hashtags that were used in the extracted tweets may add more insights. Therefore, table 5-3 shows the most obtained hashtags and their percentages.

Table 5-3, Most frequently used Hashtags in the dataset

Hashtag	FREQ	percentage	Hashtag	FREQ	percentage
#free	2036	26.67%	#waste	57	0.75%
#foodwaste	1759	23.04%	#sweden	52	0.68%
#unitedkingdom	1655	21.68%	#bracknell	47	0.62%
#london	652	8.54%	#foodforthe needy	46	0.60%
#zerowaste	558	7.31%	#woking	39	0.51%
#singapore	211	2.76%	#Leeds	34	0.45%
#jersey	126	1.65%	#didcot	30	0.39%
#food	112	1.47%	#glasgow	30	0.39%
#guernsey	86	1.13%	#vale	30	0.39%
#ashford	75	0.98%			

Stemming the text:

Before: [1] *village* *waste recycling* *waste* *food waste bins*

After: [1] *villag* *wast recycl* *wast* *food wast bin*

To this end, the data revealed 13183 unique terms with only 103553 non-sparse entries, while it had 189573451 sparse entries. Hence, a sparsity reduction was applied to remove terms that did not show in the documents by at least 1%. The new data frame had only 56 unique terms with 41101 non-sparse entries and 764627 sparse entries. Figure 5–4 shows the most frequently stemmed words in the dataset after stemming. Accordingly, the most frequently (over 300 times) used tweets are money, like, eat, people, good, time, can, much, hate, never, get, reduce, and make. These words are used to explain the following insights from the content analysis.

Accordingly, several insights can be generated from the tweets at this point. First, people consider food waste as *disgusting behaviour*. Second, *family/group consumption* is articulated in the tweets more than personal behaviour. In addition, due to *COVID-19* and its related measures such as “staying at home”, the feeling of *loneliness* even in the house leads to food waste behaviour. Fourth, people believe that the tactics to *fight* food waste are a positive thing. Fifth, people associate food waste behaviour with its *monetary* value. Moreover, the hashtags confirm the people’s preference to *#free* the world from food waste, especially in the *#UK* with *#zerowaste* campaign.

However, as these keywords can be used in either positive or negative ways against food waste behaviour, the sentiment analysis is applied to split the tweets into either positive, negative, or neutral ones. Then, the semantic network analysis is applied to figure out the most related pair of words together and stem the meaning from the nodes and edges.

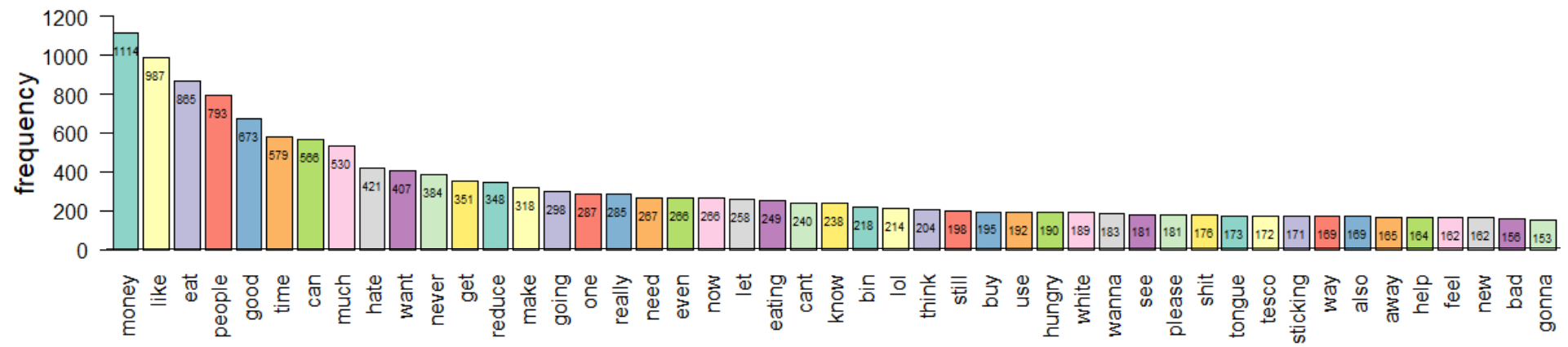


Figure 5-4, Most frequent words in tweets

5.2.4 Sentiment analysis

Sentiment analysis is an essential Natural Language Processing (NLP) technique of text (opinion) mining techniques that is widely used in marketing research to study the consumer voice, brand reputation, and online advertising (Alessia et al., 2015). It easily provides the polarity of the text by classifying it into positive, negative, and neutral classes. It can extract the features of the whole document, sentence, and feature or aspect levels (e.g., mobile phone camera). It can be performed either by lexicon-based approach or machine learning techniques (Sharma et al., 2020). More specifically, the machine-supervised and unsupervised machine learning techniques are useful in prediction, while the lexicon-based approach is useful in the interpretation (Pang & Lee, 2008). It is important to mention that the lexicon approach includes dictionaries and corpus. While the dictionaries-based analysis compares each document with seeded words, the corpus approach prepares the list of words from the text before generating new subjective words from this list (Sharma et al., 2020).

Therefore, as the whole tweet is extracted (may include many sentences) as a document (opinion) and the main objective of the text mining is the interpretation, the current sentiment analysis is applied on the document level. Moreover, since the current study collected worldwide tweets in the English language, it is important to unify the base of the sentiment analysis. Hence, this base is formal dictionaries in the current study. In this regard, it is worth noting that there are various available dictionaries for assessing someone's opinion. Hence, the current study uses 9 general purpose dictionaries to extract the sentiment scores. More specifically, cleaned and stemmed tweet's text is collapsed into words where each word represents a document. Then, each document's sentiment score is compared with the nine dictionaries. Accordingly, a tweet may have more than one sentiment score based on the number of words matching the dictionaries. Also, some tweets may have no sentiment as they may have no words matching the tweets.

The nine used dictionaries in the current study are NCR emotions, Syuzhet, Affin, and Bing from the Syuzhet package, Dictionary HE, Dictionary GI, Dictionary LM, and Dictionary QDAP from SentimentAnalysis package, and opinion lexicon dictionary for positive and negative words list (Hu & Liu, 2004;

Jockers, 2017; Feuerriegel et al., 2018). To this end, figure 5–5 shows the results of the different emotions of the cleaned tweets.

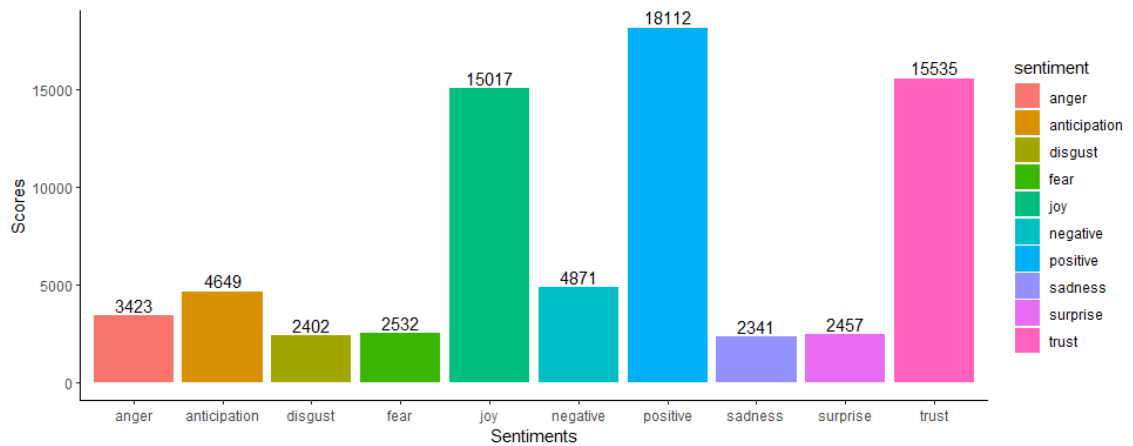
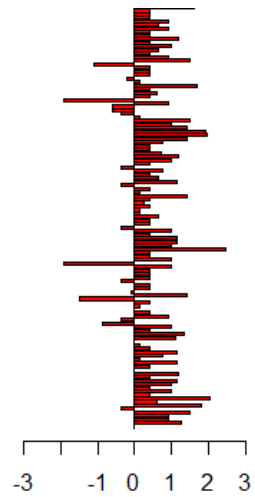


Figure 5–5, NCR emotion sentiments

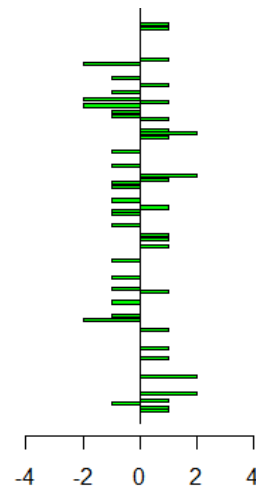
As can be seen from the NCR sentiment analysis, there are 8 different emotions that are extracted from the tweets, namely, anger, anticipation, disgust, fear, joy, sadness, surprise, and trust. It can be clearly seen that the trust and joy emotions were the most frequent emotions that appeared in the tweets by 15535 and 15017, respectively. This increases the positive sentiments (18112 times) compared to the negative ones (4871). To this end, it seems the NCR are confusing since the positive, joy, and trust emotions are the major extracted emotions from the tweets that are related to the negative phenomenon of food waste behaviour. Hence, incorporating more dictionaries is more accurate in judging each tweet. To this end, figure 5–6, figure 5–7, figure 5–8, and figure 5-9 show the results of the nine dictionaries' sentiment scores.

To this end, it can be seen that the 9 discrete sentiment charts reveal only 100 random tweets due to the space limitation in the graph. However, they all show the results of the sentiment scores for the same 100 tweets. It is clear that the distinction between the sentiment scores according to the dictionaries. For instance, the Syuzhet, and NRC provide negative sentiments, while the GI, LM, and QDAP provide negative sentiments. At the same time, Bing, Affin, HE, and opinion lexicon provide approximately neutral sentiments.

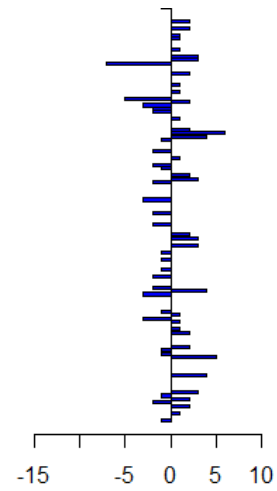
Syuzhet sentiment



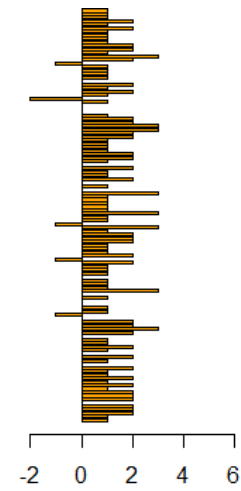
Bing sentiment



Afinn sentiment



NRC sentiment



100
tweets
only

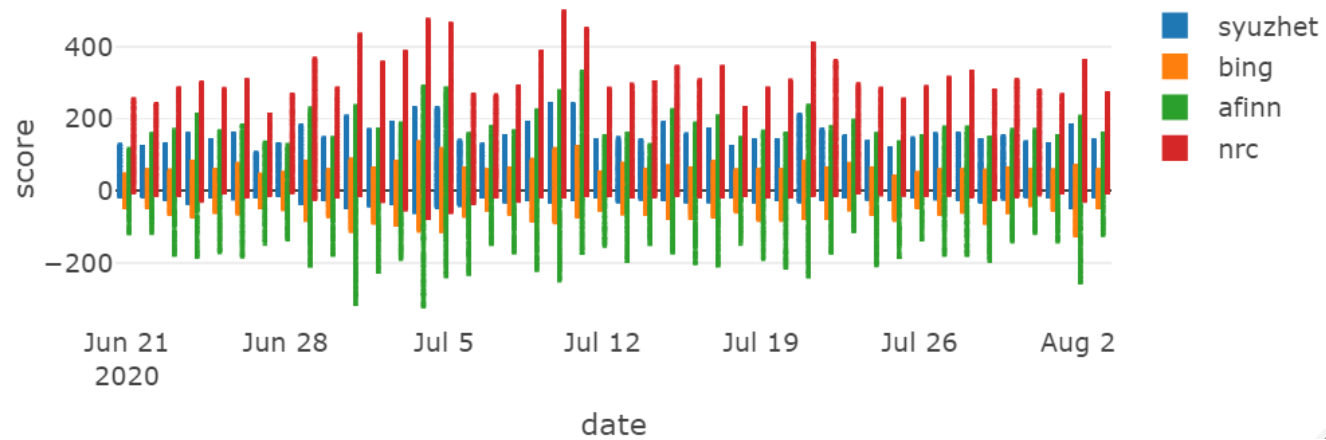


Figure 5–6, Syuzhet, Bing, Afinn, and NRC sentiment scores

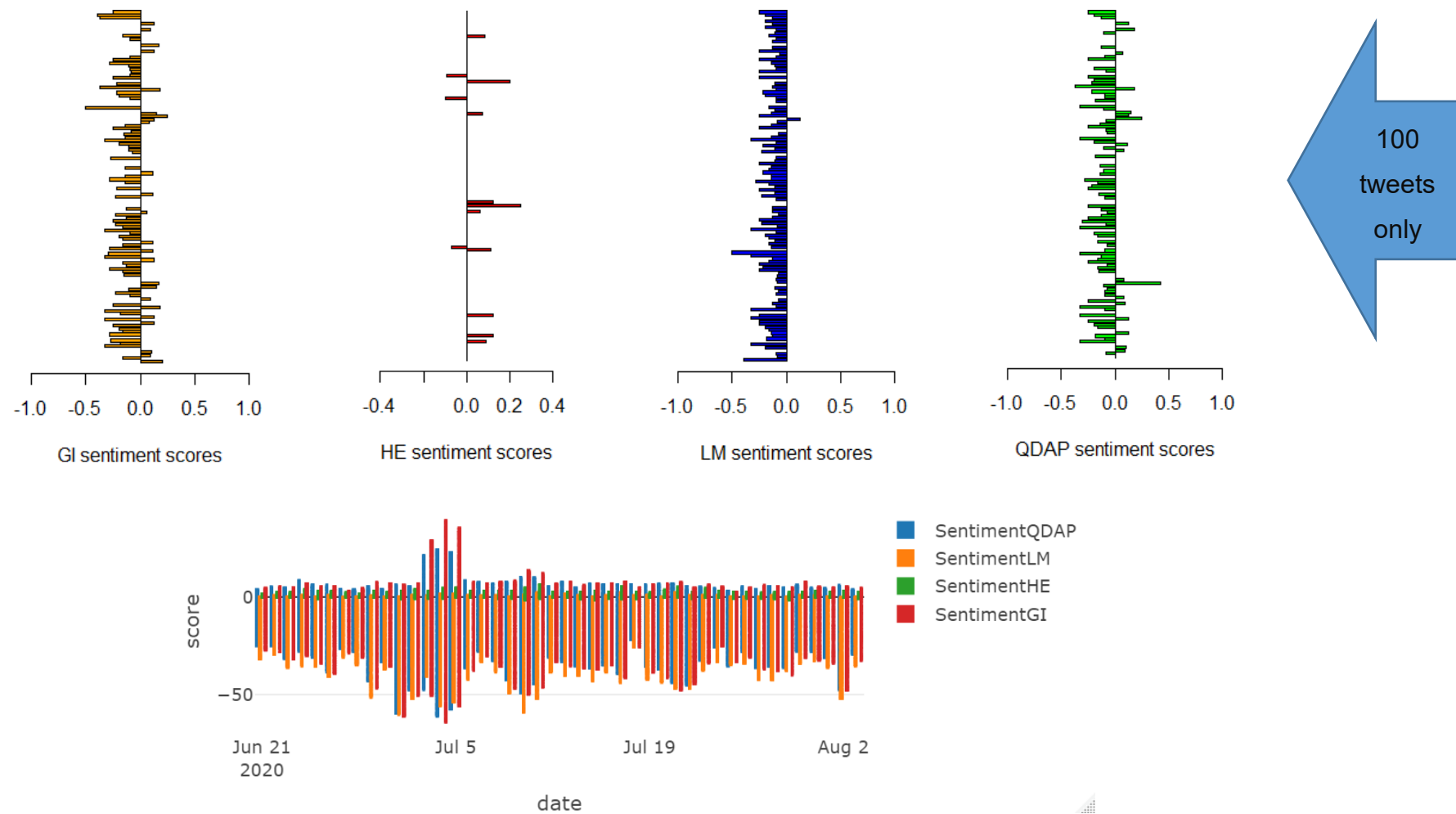


Figure 5–7, SentimentAnalysis package sentiments scores

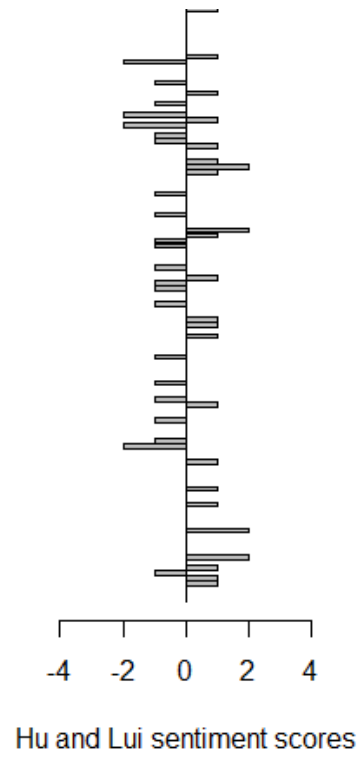


Figure 5–8, Opinion Lexicon sentiment scores (100 tweets)

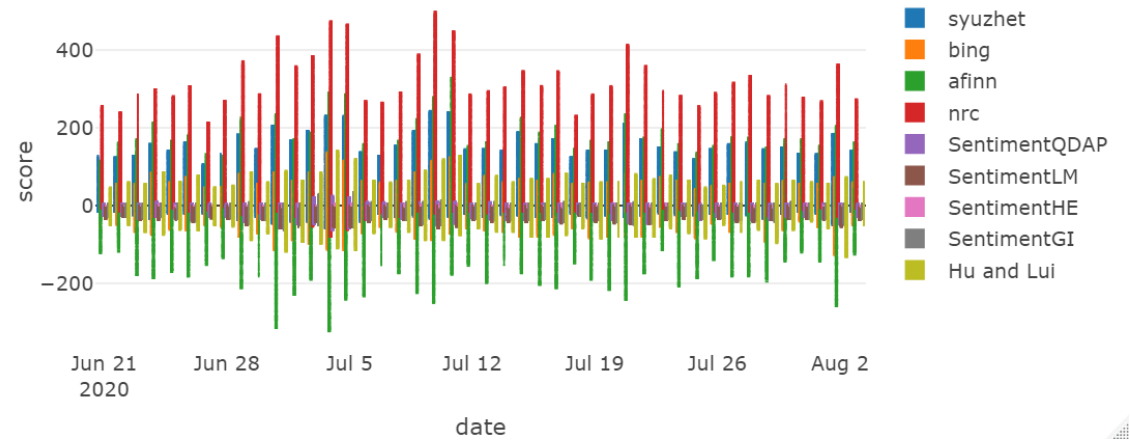


Figure 5–9, All nine dictionaries sentiment scores

Moreover, complex plots show that the first four dictionaries (Figure 5–6, Syuzhet, Bing, Afinn, and NRC sentiment scores) have positive sentiments more than negative for all tweets. On the contrary. The second four dictionaries (Figure 5–7, SentimentAnalysis package sentiments scores) show negative sentiments more than positive. Hence, the third complex plot (Figure 5 9, all nine dictionaries sentiment scores) for all nine dictionaries reports more positive sentiments than negative ones. This supports the benefit of depending on various dictionaries from different packages.

In addition, different scales were utilized for the nine dictionaries. For instance, each document has been collapsed into its words. Then each word matched the dictionary (positive and negative) words. Consequently, all sentiment scores of the words in each tweet were aggregated to provide the sentiment score of the whole tweet. To this end, the Affin uses a scale from 0 to -1 “negative” and from 0 to +1 “positive” for each word. Similarly, Suzhet uses a scale from 0 to -5 “negative” and 0 to +5 “positive”. However, Bing's lexicon and Hu and Liu's lexicon use the binary system to judge each word in positive (0 or 1) and negative (0 or 1) dictionaries. Moreover, The General Inquirer (GI) lexicon is based on the Harvard – IV dictionary, and the QDAP lexicon loads polarity words from the data object of the key. Pól (polarity lookup key), the Loughran-McDonald (LM) financial dictionary, and Henry's finance-specific dictionary (HE) use the same decimal score from 0 to 1 “positive” and 0 to -1 “negative” as the Affin lexicon.

Therefore, before composing them, all nine dictionaries were normalized from -1 as the minimum, to +1 as the maximum and keeping zeros as they are without transformation. After that, the rounded result of the scaled scores to three digits was averaged. Accordingly, a tweet with a sentiment mean score <0 , >0 , $=0$ is grouped as a negative, positive, and neutral tweet. Consequently, the 14388 tweets were classified as 9371 positive, 3745 negative, and 1272 neutral tweets. To this end, the semantic network analysis can be applied to positive and negative tweets to explore the nodes.

5.2.5 Semantic network analysis

Semantic network analysis identifies the word frequency and the connection between the words. While the word frequency can be obtained in the node size, the connection between words can be noted by the edge (connection line) thickness (Chae, 2015; Prentice et al., 2020). For instance, the current semantic network analysis depends on three assumptions. First, each word represents a node. Second, the edge is shown only if the connection between two words appears. Third, the edge thickness is based on the connection frequency.

To this end, it is worth noting that the weighted bi-gram network visualization is applied for each pair of words in each positive or negative group. More specifically, the pairwise occurrence of the words (from the cleaned but non-stemmed text) is used as the unit of analysis. Then, the most frequent pair of words over 20 (60) were selected for negative (positive) tweets as in figure 5–10 and figure 5–11.

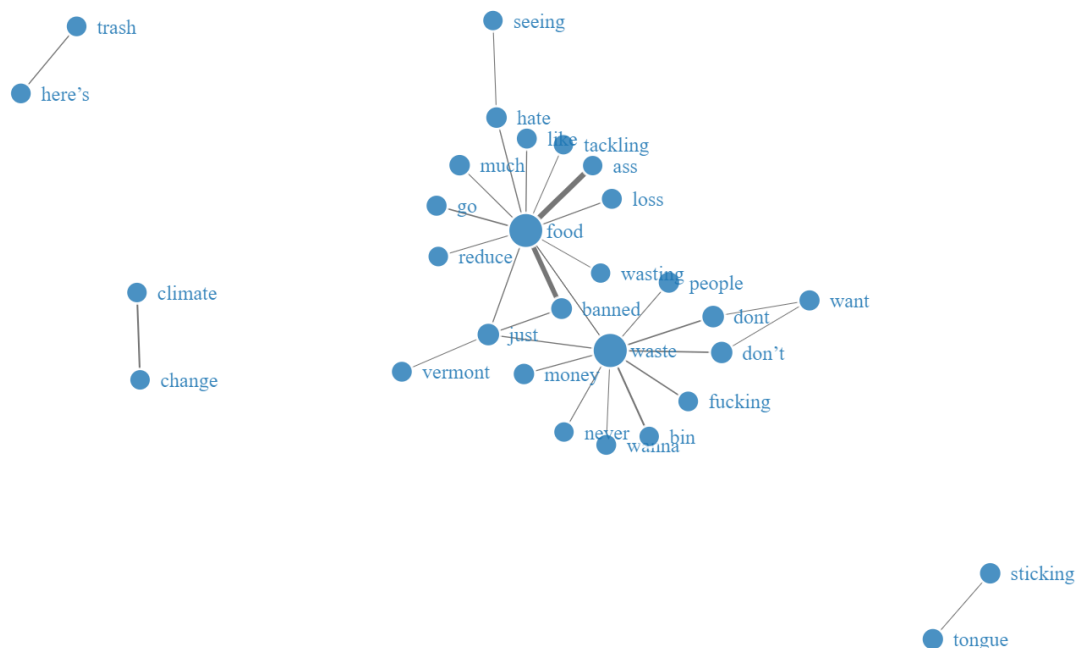


Figure 5–10, Bigram network for negative tweets

A closer look at the negative tweets in the Bigram network plot shows that “food” and “waste” are the most frequent words since they have the biggest nodes. In addition, “banned” and “ass” are most frequently closely connected with “food”, while “hate”, “tackling”, “loss”, and “reduce” are obtained as closely connected words that include the negative meaning. Similarly, the most frequently connected words to “waste” are “bin” and “fucking”. In addition, “money”, “don’t”,

“dont”, and “never” are obtained as close connected words that include negative meaning.

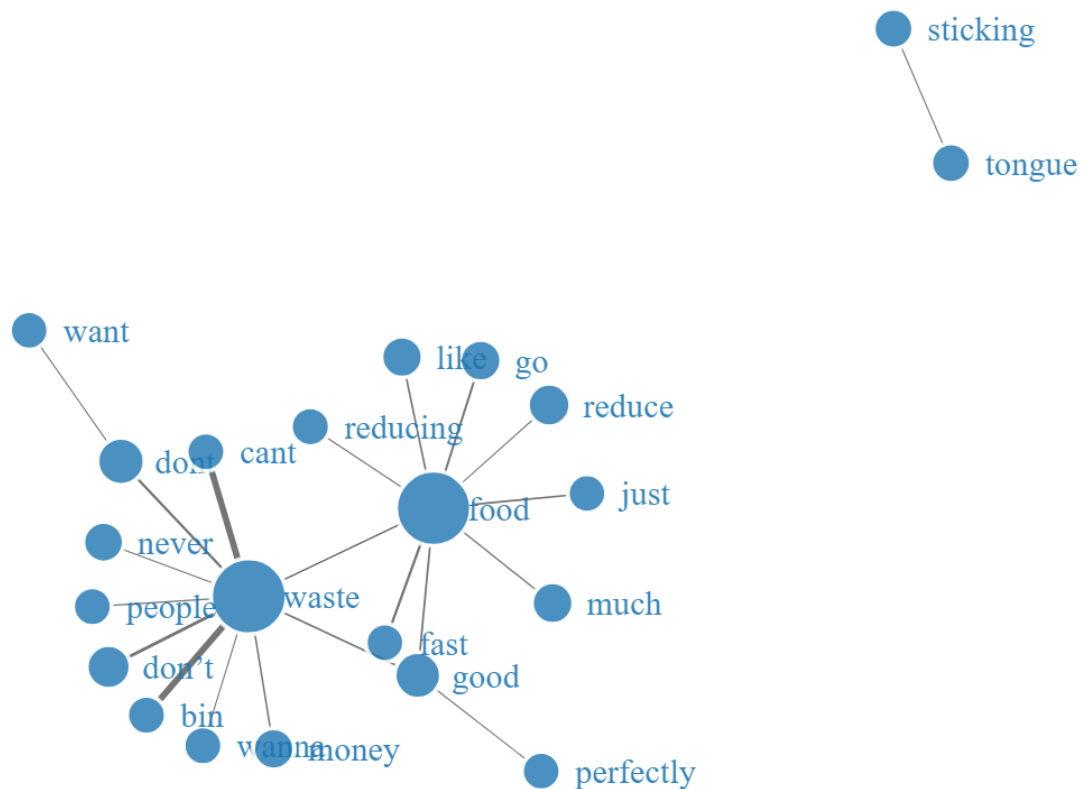


Figure 5-11, Bigram network for positive tweets

On the contrary, a closer look at the weighted Bigram network of the positive tweets shows that “food” and “waste” as the most frequent terms with the biggest nodes. In addition, the most frequent close-contact terms for “food” are “fast” and “go”. More specifically, “good”, “much”, “reduce”, “reduction”, and “like” are obtained as they hold the positive meaning. Similarly, the “waste” word is very close to the “cant”, and “bin”. In addition, “money”, “don’t”, “never”, and “dont” as they may have positive meaning. In this regard, it is worth noting that some unique terms can appear in positive and negative tweets as they are most frequently related to food or waste, regardless of the tweet's sentiment. For instance, a sentence encouraging food waste reduction (negative sentiment due to waste and reduction) may be considered positive if it includes don’t/dont/never. Hence, they appeared in positive and negative tweets.

As for the sentiment analysis, another semantic analysis technique is applied using social network plots. It depends on the same assumptions of the Bigram network analysis. As well as, it is applied to both negative and positive tweets. Figure 5–12 and figure 5–13 show the social network plots of negative and positive tweets.

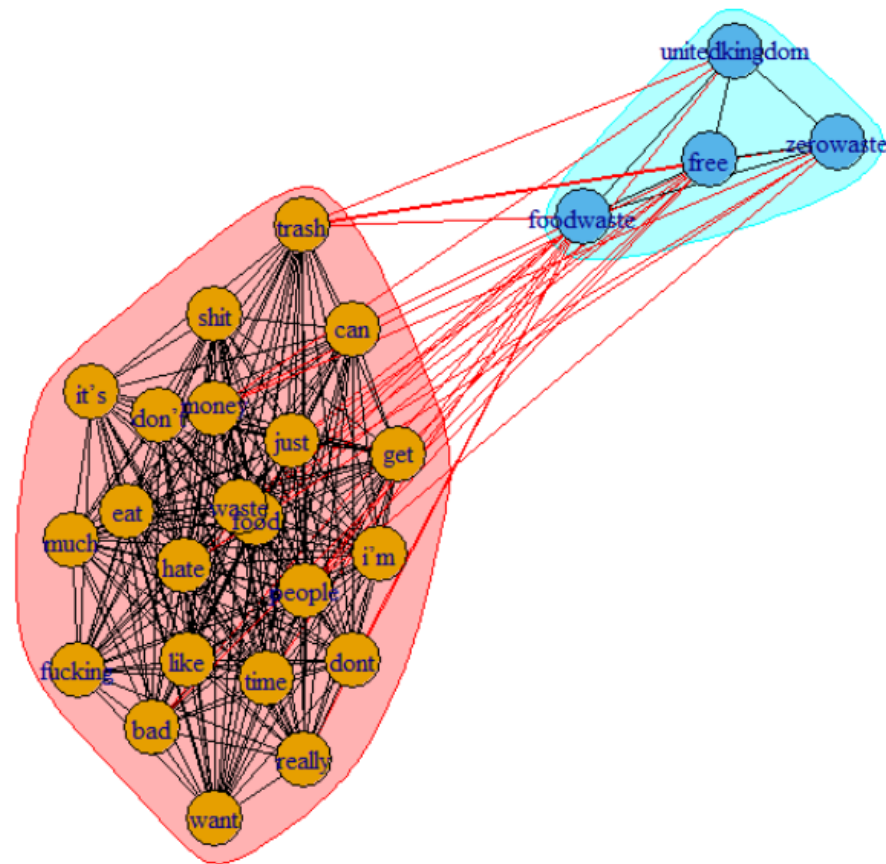


Figure 5–12, Social network of negative tweets

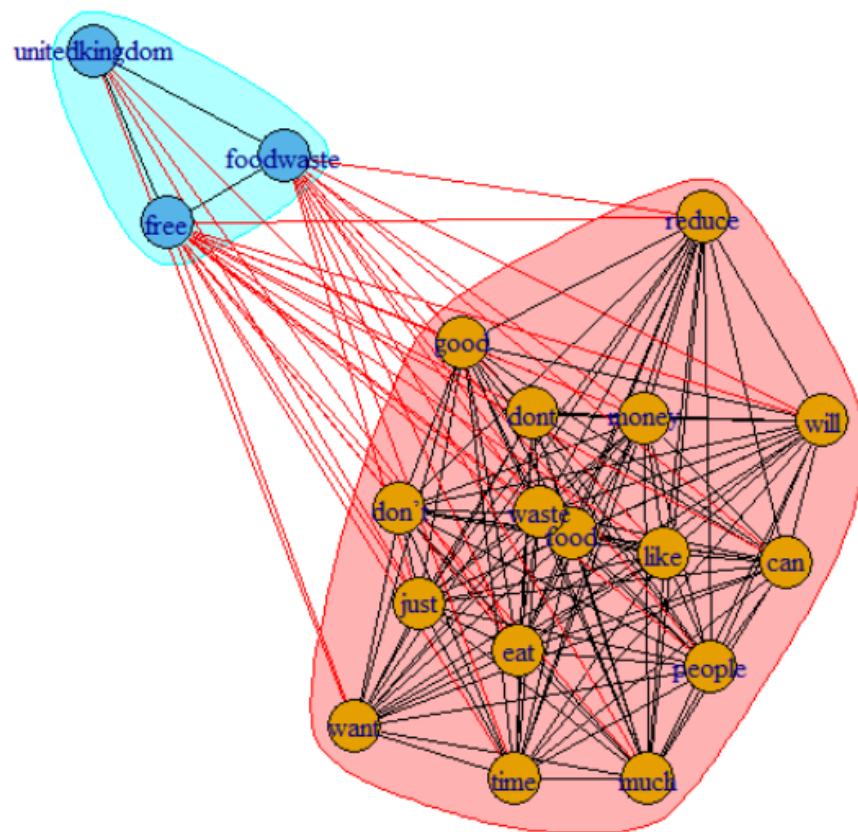


Figure 5–13, Social network of positive tweets

Apart from the above, both social network analysis plots revealed two groups of the paired terms. One group is assigned to the UK, *foodwaste*, *zero food waste* (in negative tweets only) and free. The other group is assigned to the food and waste-related terms such as the bigrams. To this end, it can be clearly seen that the main words encourage the *fighting for reducing food waste* by using hate, tackling, loss, reduce, bin, and don't. Also, the *monetary value* is mentioned in the money. In addition, due to the *COVID-19 pandemic* and its consequences, people relate *food with fast* as they may miss it in repeated *lockdown* measures. For instance, "time" is reported in positive tweets social networks as people may think about eating to *pass the time*. Moreover, campaigns like *zero food waste* are *mentioned specifically in the UK* to reduce/"free" food waste behaviour. This indeed confirms the extracted insights from the tweets that are related to *disgusting* and *fighting* food waste behaviour, the *COVID-19 pandemic*, and the *zero waste campaign in Scotland (UK)*. Accordingly, the results of the social listening study can be summarized.

5.2.6 Main insights of X data analysis

To this end, the study insights from X data analysis can be summarized in Table 5-4, to achieve the first two research objectives: *Obj1*: Explore the general awareness of food waste among households, and *Obj2*: Uncover the role of COVID-19 pandemic on the food waste issue among households. Accordingly, these insights are suggested to help in developing the conclusive survey.

Table 5-4, Main insights of X data analysis results

Research objective	Main results	Related Insights for Conclusive Research
<i>Obj1</i> : Explore the general awareness of food waste among households.	-People consider food waste as <i>disgusting behaviour</i> . -People believe that the tactics to <i>fight</i> food waste are a positive thing. -The main words encourage the <i>fighting for reducing food waste</i> by using hate, tackling, loss, reduce, bin, and don't.	- General awareness about irresponsible behaviour is proven. What are the <i>main drivers</i> of committing such unethical behaviour? -Moreover, <i>intentions to reduce food waste behaviour</i> can be used instead of studying it since respondents may dislike revealing their irresponsible behaviour due to social desirability reasons.
	- <i>Family/group consumption</i> is articulated in the tweets more than personal behaviour.	- Group Consumption Behaviour is well reported. Hence, the <i>family</i> unit of analysis can be used for the conclusive research.
	-People associate food waste behaviour with its <i>monetary</i> value.	- Monetary value is reported. Therefore, there is a need to study the actual food waste. However, this means the respondents must actually waste the food during the study or remember last year's food waste value. Hence, there <i>intention</i> to waste the food can be used.
	-Hashtags confirm the people's preference to <i>#free</i> the world from food waste, especially in the <i>#UK</i> with <i>#zerowaste</i> campaign.	- Food waste campaigns are well-perceived. However, there is a need to understand the role of <i>campaigns</i> in Muslim-dominated communities.
<i>Obj2</i> : Uncover the role of	-Due to <i>COVID-19</i> and its related measures such as "staying at home", the feeling of <i>loneliness</i> even in the	-Loneliness feeling should be studied as wasting food seems a self-regulated means.

Research objective	Main results	Related Insights for Conclusive Research
COVID-19 pandemic on the food waste issue among households.	house leads to food waste behaviour. For instance, “time” is reported in positive tweets on social networks as people may think about eating to <i>pass the time</i> .	
	Due to the <i>COVID-19 pandemic</i> and its consequences, people relate <i>food with fast</i> as they may miss it in repeated <i>lockdown</i> measures.	- Fasting in Ramadan is one pillar of Islam, but to what extent do Muslims <i>relate fasting to food waste</i> ? If fasting leads to food waste, are there other variables that may cause this <i>conflict</i> ?

5.3 Exploratory study analysis

This study is devoted to achieving the third research objective: *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month). Therefore, it begins with the sample characteristics. Then, descriptive statistical analyses were applied to understand various aspects of food waste behaviour. Finally, comparative inferential statistical analysis was applied to statistically infer the results for the further conclusive study.

5.3.1 Sample distribution

A total of 299 complete and valid questionnaires were retained for the analysis. The current study data have been collected in English (13.38%) and Arabic (86.62%). Also, almost half of the sample was collected during the holy month of Ramadan (47.16%), and the rest was collected directly after the holy month. This is to reflect the coverage of the whole month's experience. In addition, the majority of the data (79.93%) was collected from residents in Egypt and 8% from Saudi Arabia. Table 5-5 summarizes the sample distribution according to various demographic factors of the females.

As can be obtained from table 5-5, the sample majority was allocated to women who are aged between 20-40 years old (76.9%). In addition, the most frequent education level was University education (47.8%), then postgraduate studies (42.5%). This could rationalize the big cluster of employed women

(65.9%). Moreover, the family's main monthly income classes were less than \$500 (36.1%) and between \$500 and \$1000 (35.5%). To this end, the married women were 35.8%, while married women with children were 56.5%.

Table 5-5, Sample distribution of the exploratory study

Demographic factor	Categories	Frequency	%	Demographic factor	Categories	Frequency	%
Age	less than 20	3	1.0	Marital status	married	107	35.8
	20- less than 30	111	37.1		married with children	169	56.5
	30- less than 40	119	39.8		divorced	7	2.3
	40- less than 50	43	14.4		Divorced, with children	9	3.0
	50- less than 60	20	6.7		widowed	4	1.3
	60 +	3	1.0		widowed with children	3	1.0
Education level	Less than high school	8	2.7	Number of family members living with you (including you)	1	3	1.0
	High school	21	7.0		2	20	6.7
	Graduate	143	47.8		3	62	20.7
	Post-graduate	127	42.5		4	94	31.4
Current job	Unemployed housewife	102	34.1		5	65	21.7
	Part time	55	18.4		6	34	11.4
	Full time	142	47.5		7	14	4.7
Managerial level	Direct management	29	15.8		8	3	1.0
	Middle management	86	46.7		9	2	.7
	Top management	69	37.5		10	1	.3
Monthly family income	less than \$ 500	108	36.1		11	1	.3
	from \$500 to less than \$1000	106	35.5				
	from \$1000 to less than \$3000	57	19.1				
	\$3000 +	28	9.4				

5.3.2 Descriptive statistics

The descriptive statistics were applied to determine the importance of the Ramadan banquet, food preparation for these banquets and the reasons behind it, family food disposal behaviour, eating styles, food waste campaigns, food waste value, and family food buying behaviour.

5.3.2.1 Ramadan's Banquets

According to figure 5–14, Muslims hosted between 2 to 5 banquets in the holy month of Ramadan (77.91%). While 12.71% did not host any banquets that month, the rest of the sample (9.35%) held more than 5 banquets. Therefore, the normal distribution of the sample could be obtained from these frequencies (skewness = 1.58, kurtosis = 3.94).

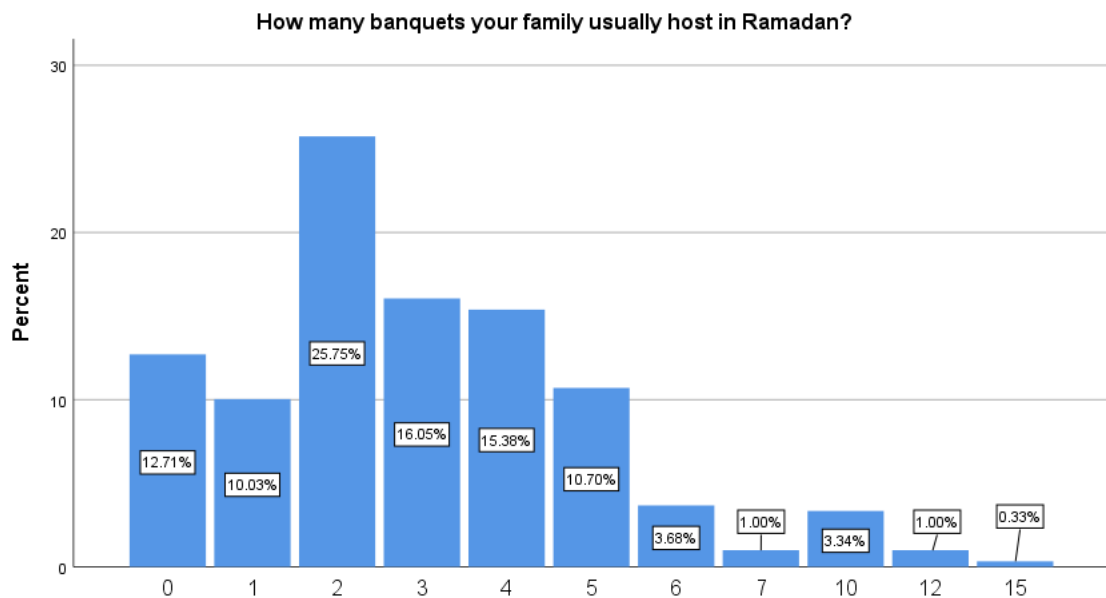


Figure 5–14, Number of hosted banquets in the holy month of Ramadan

In addition, as can be seen from figure 5–15, the whole sample was skewed to the left where the low number of banquets during non-Ramadan months (skewness = 2.95, kurtosis = 12.22). It can be seen that in 11 months, the majority of the sample held between 1 to 10 banquets of the year (68%). While 6.4% did not have any banquets, the rest of the sample (26.4%) held more than 10 banquets in the other months of the year.

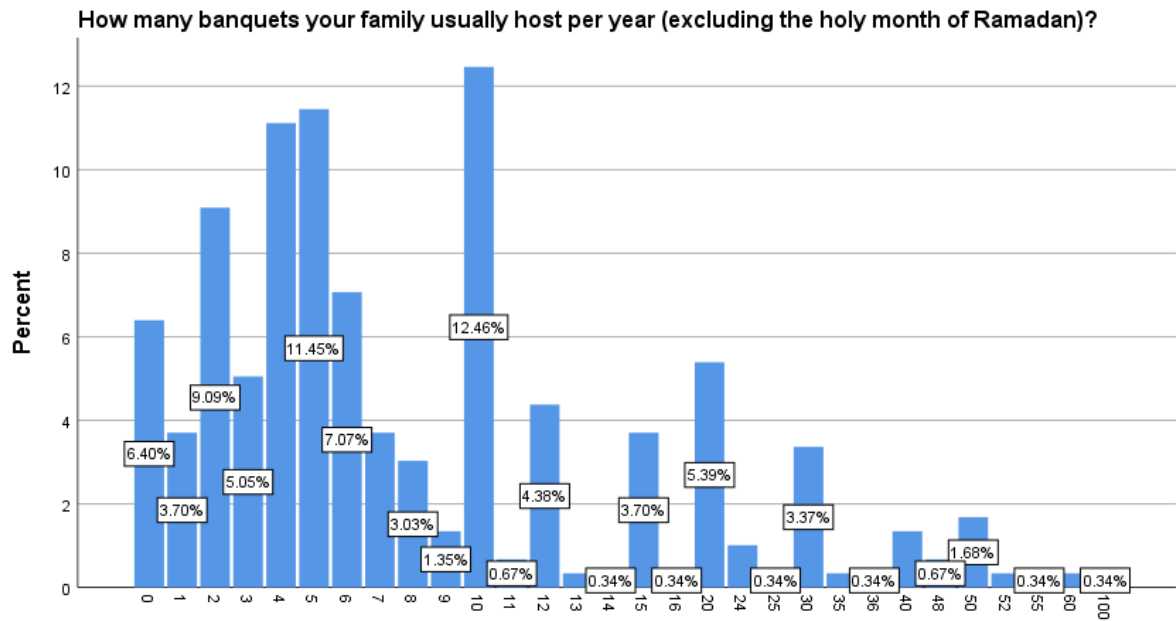


Figure 5–15, Number of hosted banquets in the non-Ramadan months

To this end, most of the sample held between 2-5 banquets in the holy month of Ramadan compared to less than 1 banquet in any other month of the year (1 to 10 in the other 11 months). Hence, the holy month of Ramadan could be a *season of banquets* for Muslim households.

5.3.2.2 Banquets food volume:

More than one-third of the sample (37.79%) directly confessed their food preparation that did not match the banquet needs, as in figure 5–16.

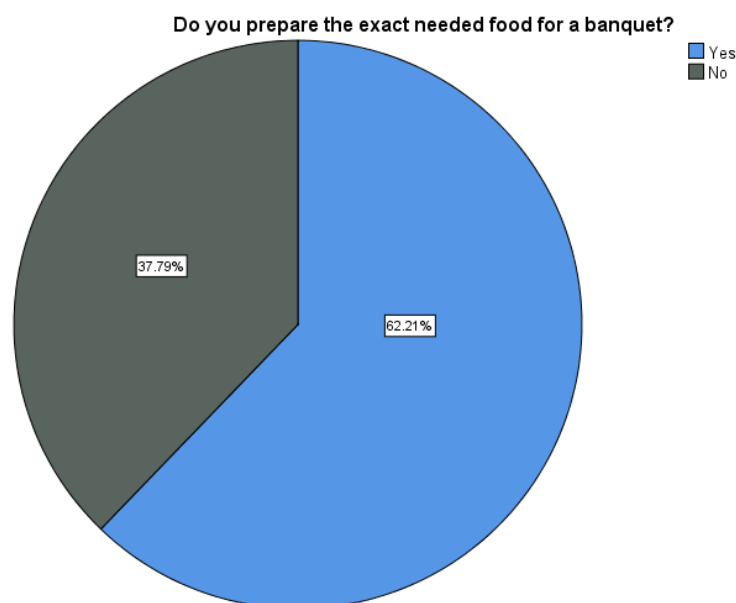


Figure 5–16, Banquet food volume

Although women preferred not to report their food waste behaviour, later on, most of them revealed more than a way to reduce their waste. For instance, most of them reported their food waste quantity, and percentage to their family income. This can be explained next in line with the social desirability theory.

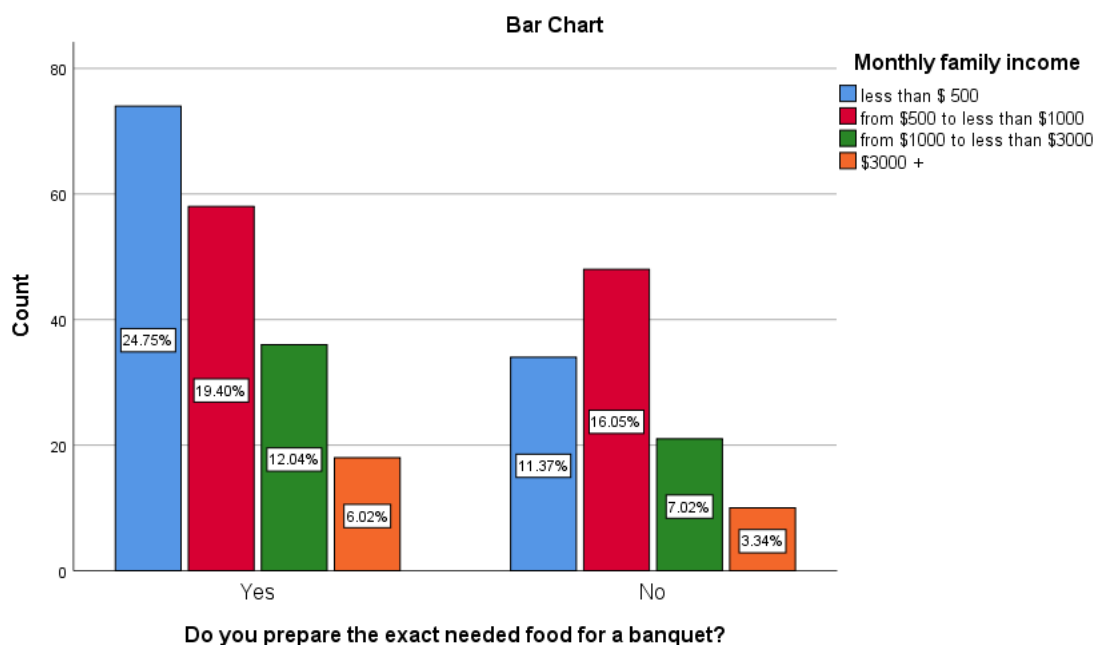


Figure 5–17, Banquet food volume across income levels

As can be seen from figure 5–17, the lowest income categories were not reporting their extra food preparation and subsequent food waste generation. However, the *middle and high-income* - social class families reported their behaviour. This could be due to two reasons. First, the social desirability that the low-income families sought stopped them from reporting their “incongruently thought” misbehaviour in food preparation as it might reflect a decreased elegant and classier image. Second, they really meant it. However, only 42 women out of the 186 (62.21%) who prepared the exact food for the banquets reported zero food waste in Ramadan as they were very low income (less than \$500 per month). This means 77.4% of the women who reported their exact food preparation for banquets may waste the banquet food.

To this end, the multi-response item of reasons for cooking extra food for banquets reveals 136 reasons for a third of the sample, 37.79%, as in Table 5-5. More specifically, the most important reasons were that women feared the increasing number of *unplanned guests* (55.14%); this was approved by 5.15% who feared insufficient banquet food, which caused embarrassment to the entire

host family. Moreover, women preferred to cook extra food to show their *family generosity* (26.5%). This means people use extra food to prove their *desired social class* (4.38%). Only 0.7% of the women felt ashamed when they realized the possibility of insufficient food may occur. In addition, women tried not to show their social class from food; instead, they tried to make their guests more comfortable by introducing various types of food (2.2%), which made them feel safe from the food quantity (1.47%) as a kind of honouring and welcoming the guests (1.47%). Interestingly, 2.9% of the women cooked extra food for banquets to *save their effort in cooking* the banquets the following days. Hence, this reason does not increase the food waste.

Table 5-6, Banquets extra food preparation reasons

Reasons	Percentage
Fear of the increasing number of unplanned guests	55.14%
Fearing that the food will not be enough and its embarrassment	5.15%
Show my family generosity	26.5%
Social desirability	4.38%
We grow as it is a shame if the food is just enough for the banquet	0.7%
Different dishes to make the guests eat what they prefer, Hence, different leftovers	2.2%
More food makes the guests feel comfortable while eating and safe from the food quantity	1.47%
Honouring guests	1.47%
In order not to cook for two days after the banquet	2.9%

5.3.2.3 Family food leftover disposing ways:

A multi-response item of the extra food disposal revealed 470 responses in table 5-7. Women most frequently disposed of their families' leftovers by *keeping them in the fridge* 46.8%. However, 22.77% of the ways were devoted to *reusing it directly*. *Donating* it to the needy was dominated by about one-fifth of the ways (19.57%). Only 2.13% represented *throwing it away*. *Distributing among the guests* was 0.85%, and 0.21% *distributed them around themselves*.

Table 5-7, Extra food disposing behaviours

Reasons	Percentage
Keep it in the fridge	46.8%
reuse it	23.19%
Give it to poor	19.57%
feed animals with it	7.23%
Throw it away	2.13%
distribute it among the guests if it is a lot	0.85%
Distribute it to those around me	0.21%

This can conclude that almost 80% of the ways were to self-consume it, whether keeping it in the fridge, reusing it, or feeding it to the animals. Hence, the food leftovers were mainly not wasted. Only less than 20% was *donated* to poor persons. Finally, almost 1% of the sample shared these food leftovers with others (e.g., guests or relatives and neighbours). Thus, *food sharing* was not a common practice among the sample. This is due to the high awareness level of hygiene issues after the *COVID-19 pandemic*.

5.3.2.4 Eating styles:

According to the eating style chart in figure 5–18, *90% of the sample do not follow a specific eating style*. As well as 8.7% were flexitarian. Hence, only 0.3% and 1% were Vegan and Vegetarian, respectively. This reflects that most women in the sample were not aware of their eating styles or their benefits in the long run. Hence, 81.3% of the sample did not think that their eating style affects food waste generation.

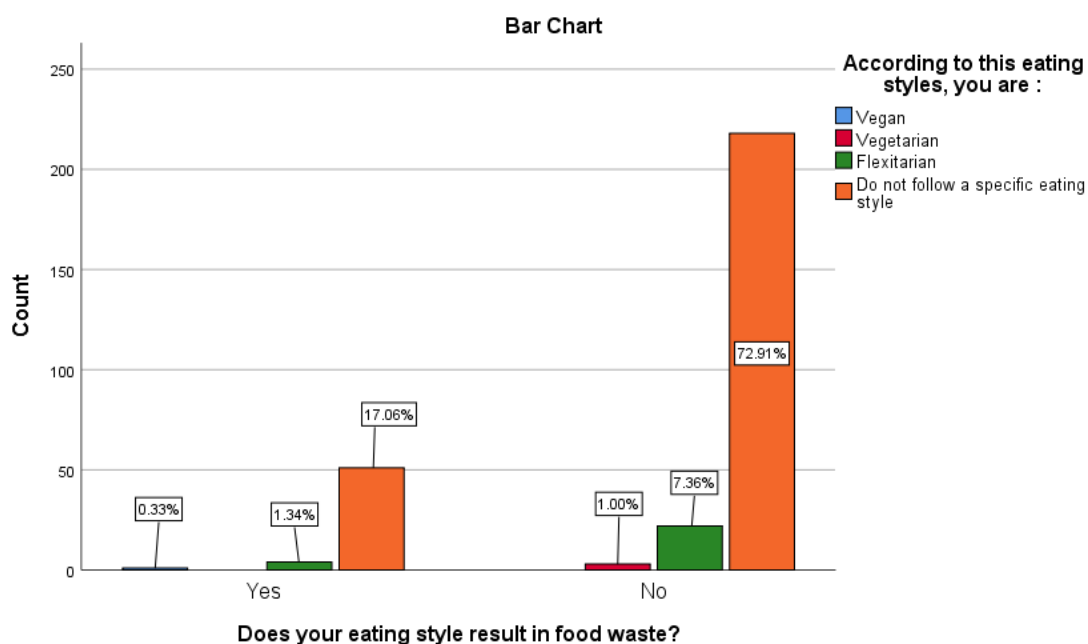


Figure 5–18, Eating style and food waste

To this end, only 56 women thought that their eating style affected their food waste. Women reported different forms of how their eating style affects their food waste generation, as in table 5-8. Almost two-thirds (64.7%) of those who agreed on eating style-food waste relationship reported that preparing excess food was the major cause of the food waste. However, 8.8% of them reported that their eating style increased their food waste due to their desire to eat different kinds of food. Moreover, 8.8% of them reported that they kept the leftovers in the fridge as they thought that they might eat at a certain point. However, they forgot it. In addition, 5.9% witnessed that they did not eat the leftover as it is spoiled and then they throw it away. Only one woman said that she usually eats outside while leaving the homemade food which results in increasing the homemade food waste. Moreover, three women reported their inability to prepare the exact prescribed recipes for their eating styles, nor the exact quantity, in addition to their overall lack of cooking method knowledge. Hence, the eating style awareness needs to be created.

Table 5-8, Eating style reasons to increase food waste

Reasons	Percentage
Excess food	64.7%
The desirability of food variation	8.8%
Forgetting the food in the fridge	8.8%
Spoiled	5.9%
Eating outside and leaving the homemade food	2.9%
Failing to cook exact eating style recipes	2.9%
Preparing the exact needed food quantity	2.9%
Lack of method awareness	2.9%

5.3.2.5 Food waste management campaigns:

As can be seen in table 5-9, almost only one-third of the sample answered this question. 19.1% of the sample did not know of any food waste management campaign. As well as 5.4% of the sampled women did not follow any campaign. Therefore, only *less than 10% reported the campaigns* that they follow. The most followed campaigns are introduced by Food banks 3.6%, followed by one well-known charity and non-profit organization (i.e., Resala in Egypt) 1.7%, followed by the religious traditions of Islam 1.3%. Then different campaigns are reported by only one woman per each. This reflects that the awareness of food waste needs to be created, differentiated, maintained, and, most importantly, supported by businesses and governments.

Table 5-9, Food waste campaigns

Food waste campaigns	Percentage	Food waste campaigns	Percentage
Missing	65.95%	Social dinners in Spain	0.3%
Do not know	19.1%	No food waste	0.3%
Do not follow any	5.4%	No for Consumerism	0.3%
Food bank (Egyptian food bank)	3.3%	Green pan	0.3%
Resala (Message)	1.7%	Backed	0.3%
Religion	1.3%	General donation	0.3%
Mosque fridges	0.7%	Drivers and cleaners in our street	0.3%
Bank Eta'am (Saudi food bank)	0.3%		

5.3.2.6 Food waste value

In order to understand women's awareness of the food waste value, they were asked about the value itself without specifying the type of it. Therefore, different values were reported (economic, financial, social, ...etc). Only 115 women have answered this question as in table 5-10.

Table 5-10, Food waste general value per meal

Food waste values	Percentage	Food waste values	Percentage
I can not	36.52%	I do not like it	0.87%
Healthy value	13.91%	Less important	2.61%
Financial value	5.22%	low value	8.70%
Edible and non-edible	1.74%	Moderate	3.48%
Food types	20.87%	Important	2.61%
all important	1.74%	Very important	0.87%
Meal	0.87%		

Accordingly, more than one-third of those who answered the food waste value question *could not give a specific value* to their food waste (36.52%). Only about 14% of them reported *healthy values* by categorizing their food waste into Fats, Carbs, and Protein. Also, 5.22% of them reported the financial value of the food waste by giving the estimated monetary value of their food waste. Unlikely, 1.74% of them successfully reported the food waste value by dividing it into edible and non-edible food. This approximately 20 % of the food waste values urged for the necessary need to create and maintain the food waste issue campaign to create the household's awareness. Otherwise, women maintain their low level of understanding of the importance of the issue and think that food waste is not important and is less valued (11.31%). Consequently, the food waste quantity per meal in the holy month of Ramadan can be explored in table 5-11.

Table 5-11, Food waste quantity per meal in the holy months of Ramadan

Food waste quantity per meal								Percentage	
Zero								21.90%	
Unrecognized								5.37%	
10%KG	0.41%	Half a cup	0.41%	Very little	8.26%	10% less or	11.57 %	1 adult or less	0.41 %
125%KG	0.41%	50% of a plate	0.83%	Little	8.68%	More than 10% to 20%	5.79%	1 adult	4.55 %
10-20% KG	0.41%	less than 1 plate	0.83%	50% of the carbs	0.41%	More than 20% less than 25%	9.09%	2 adults	0.83 %
20% KG	1.24%	1 plate	8.68%	Big part	0.41%	More than 25% less than 50%	2.89%		
25% KG	2.07%	2 plates	1.65%	Very little	8.26%				
50% KG	1.24%	4 plates	0.41%						
1 KG	0.83%								
2 KG	0.41%								

As can be seen, *different measures of the quantity* of food waste were reported from 242 women. Interestingly, 20.9% of them reported zero food waste per meal in the holy months of Ramadan. In addition, 5.37% of them did not know the exact food waste quantity per meal during Ramadan. This means they did not care about it. Hence, almost *75% of them have reported their food waste quantity per meal during Ramadan*.

Those 75% of women reported five measures of food waste per meal during Ramadan. *Kilogram plates describe the quantity, % of the food, and adult meal measure*. Thus, different measures reflect the difficulty of measuring the food waste generated. Some of them reported a percentage of the Carbs only, half a cup, half a plate, and one adult or less. These descriptive measures urge the need to create awareness about the food waste issue and its sustainable importance. The researcher did not intend to measure the generated food waste per meal; however, the main issue was to test the women's awareness of the food waste value issue.

5.3.2.7 Family food buying behaviour

As in table 5-12, a total of 352 answers to a multi-responses question revealed that only 1.4% of women bought their food from Farms. While 39.5% of the women got their food from *retailers*, 59.1% of them found their food from *open markets*.

Table 5-12, Food-buying resources

Food buying resources	Percentage
Farms	1.4%
Open markets	59.1%
Retailers	39.5%

Moreover, most women reported their family food buying behaviour as 4 times per month, which is a weekly basis. Moreover, as can be seen from figure 5–19, the buying behaviour that follows a *regular basis* was higher than the random behaviour. This reflects the increased number of 5 times per month and more in the random basis category than the regular basis. This means that there was a well-established starting point to organize the food cooking, and then the generated food waste.

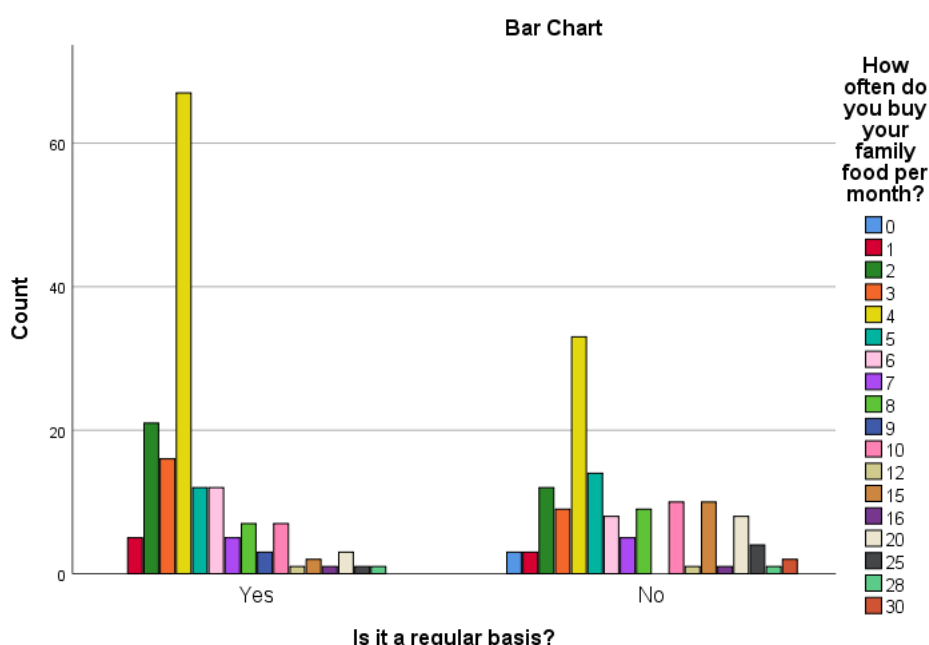


Figure 5–19, Food buying behaviour regularity

With regard to the percentage of the food per week to the family income, answers were not reliable to be reported as some did not answer on a weekly

basis; some of them gave numbers that almost represented value to a percentage. Hence, the researcher decided not to include them.

5.3.3 Comparative statistical analysis

In this part of the study, the comparative analysis using one sample and independent samples *t*-tests were applied to understand the spirituality context, food waste classification, food waste drivers, food waste management, and food waste management tactics.

5.3.3.1 Spiritual effect presence

This section presents to what extent the women in Muslim families are aware of their religious teachings towards eating and food behaviour. First, with regard to the prevention of wasting food, The Holy Qur'an says, "*Children of Adam,eat and drink, and do not waste. He does not love the wasteful*" (Sura 7, verse 31). Accordingly, the sampled women significantly agreed to follow this rule to reduce food waste to obey God. ($\mu = 6.32 \pm \text{StD} = 1.325$, $t\text{-value} = 30.059$, $p. < 0.000$).

Similarly, the women significantly agreed on following the prophet Mohamed (PBUH) speech, "*Whoever among you wakes up physically healthy, feeling safe and secure within himself, with food for the day, it is as if he acquired the whole world*" (Sunnah, Jami` at-Tirmidhi 2346) regarding the ethics of eating the food to reduce the food waste by buying only the needed food for the day ($\mu = 5.43 \pm \text{StD} = 1.825$, $t\text{-value} = 13.421$, $p. < 0.000$).

More specifically, there was a significant acceptance of following the prophet Mohamed's (PBUH) food ethics encouragement: "*He also commanded us that we should wipe the dish saying: You do not know in what portion of your food the blessing lies.*" (Sunnah, Sahih Muslim 2034). To reduce the food waste by accurately estimate the food per dish. ($\mu = 5.89 \pm \text{StD} = 1.573$, $t\text{-value} = 20.575$, $p. < 0.000$).

In addition, they significantly agreed on following the prophet Mohamed (PBUH) rules concerning leftover eating behaviour to reduce the food waste; "*Mention Allah's Name (i.e., say Bismillah), eat with your right hand, and eat from what is in front of you*" (Sunnah, Riyad as-Salihin 727) to keep leftover untouched ($\mu = 6.29 \pm \text{StD} = 1.525$, $t\text{-value} = 25.365$, $p. < 0.000$). As well as "*When any one*

of you drops a mouthful, he should remove anything filthy from it and then eat it and should not leave it for the Satan” (Sunnah, Sahih Muslim 2033b) ($\mu = 5.44 \pm \text{StD} = 1.89$, $t\text{-value} = 13.089$, $p. < 0.000$).

Overall, the *agreeableness* of the five-eating ethics and rules reflects the existence of the *spiritual aspect* in the women's lives when they prepare their Muslim family food. However, although the high acceptance of these Islamic teachings, the actual behaviour does not necessarily follow them in real life. For instance, 21.7% of the sample answered less than 4 out of 7 on the 7-point liker type scale (1) totally disagree to (7) totally agree on the last Islamic teaching of the eating behaviour as prophet Mohamed (PBUH) said, “*When any one of you drops a mouthful, he should remove anything filthy from it and then eat it and should not leave it for the Satan*” (Sunnah, Sahih Muslim 2033b). This can be explained in line with the attitude-behaviour gap in ethical situations (Sudbury-Riley & Kohlbacher, 2016).

5.3.3.2 Food waste context in Ramadan

In addition, there was a significant disagreement on the family food waste generation at the breakfasting in Ramadan ($\mu = 2.3 \pm \text{StD} = 1.681$, $t\text{-value} = -17.507$, $p. < 0.000$). Similarly, they significantly disagreed on their family food waste generation at the pre-fasting meal (Sohour) in Ramadan ($\mu = 1.75 \pm \text{StD} = 1.445$, $t\text{-value} = -26.9$, $p. < 0.000$). Hence, food waste behaviour *was not significantly different* from *a pre fasting meal to a breakfast* meal in the holy month of Ramadan.

Interestingly, they also significantly rejected that the food waste at the *beginning of the holy month* of Ramadan was more than *at the end* of the same month ($\mu = 3.27 \pm \text{StD} = 2.279$, $t\text{-value} = -5.541$, $p. < 0.000$). This means that the exaggerated feeling of hunger due to fasting at the beginning of the fasting month was not the main cause of wasting the food. Also, women reported that this exaggerated feeling could stimulate them to cook more food at the beginning of Ramadan. However, the leftovers are eaten and not wasted.

Consequently, women significantly disagreed on throwing the food before it expired ($\mu = 2.28 \pm \text{StD} = 1.907$, $t\text{-value} = -15.585$, $p. < 0.000$). As well as they *could well categorize the food waste into edible and non-edible* ($\mu = 4.99 \pm \text{StD}$

=2.102, t -value = 8.128, p . < 0.000). These results were confirmed in both data subsets in Ramadan and after Ramadan. More specifically, women reported 389 different kinds of edible food waste from a multi-response question that can be categorized, as in table 5-13.

Table 5-13, Edible food waste items

Edible food waste	%	Edible food waste	%	Edible food waste	%
Rice	30.85%	Legumes	2.57%	Milk	0.51%
Vegetables	19.02%	Soup	2.31%	Samosa	0.26%
Pasta	13.62%	Fruits	1.54%	Cheese	0.26%
Carbs	8.23%	Chicken	1.29%	Appetizers	0.26%
Bread	5.40%	Juice	1.29%	Boiled	0.26%
Meat	3.86%	Protein	0.51%	Eggs	0.26%
Salad	3.34%	Fats	0.51%	Fish	0.26%
Desserts	3.08%	Fried	0.51%		

As can be seen, Rice, vegetables, Pasta, carbs, and Bread were the major wasted foods in Ramadan. This is due to the high-volume consumption of these low-priced items. As well as the majority of the sample *did not follow an eating style or diet system that may guide them to different healthy foods such as Protein*. This can be utilized by reporting different types of Carbs, such as Rice and Pasta. Hence, cooking too much of these kinds of food increases their generated waste. To this end, the key reasons behind food waste behaviour in the holy month of Ramadan are summarized in table 5-14.

Table 5-14, Food waste behaviour drivers in Ramadan

Reasons of food waste in Ramadan	Descriptive statistics		Test Value = 4			
	Mean	StD	Mean Difference	t	df	Sig. (2-tailed)
Impossible to store some foods; the necessity of them getting consumed at once	5.20	1.970	1.205	10.557	297	.000
Banquets	4.79	2.160	.791	6.313	296	.000
Unplanned purchasing	4.65	2.256	.649	4.947	295	.000

Reasons of food waste in Ramadan	Descriptive statistics		Test Value = 4			
	Mean	StD	Mean Difference	t	df	Sig. (2-tailed)
lack of experience	4.58	2.275	.576	4.350	294	.000
Exaggerated hunger due to fasting	4.42	2.195	.416	3.273	297	.001
Food banks only accept untouched food waste from agencies and not individual households	3.96	2.127	-.041	-.331	289	.741
Eating leftovers is not accepted in my family	3.70	2.336	-.296	-2.185	296	.030
Non-edible food components	3.61	2.224	-.392	-3.032	295	.003
The expiration date is not clear	3.45	2.323	-.545	-4.046	296	.000
I cannot prepare a recipe from the untouched food	3.36	2.266	-.637	-4.830	294	.000
Underprivileged people do not accept the leftovers	3.38	2.127	-.623	-5.046	296	.000
I cannot prepare a recipe from the leftover food	3.05	2.193	-.953	-7.489	296	.000

As can be seen, the most accepted reasons for the increase in food waste during Ramadan were the impracticality of food storage, the banquets, the unplanned purchases, and the lack of experience.

To begin, the most common reason for generating food waste during Ramadan was the *impossibility of storing the food* that is necessary to be consumed at once ($\mu = 5.2 \pm \text{StD} = 1.97$, $t\text{-value} = 10.557$, $p < 0.000$). Accordingly, consumers should only buy limited items of these food items, as well as try to find unpacked items of these foods to customise their needed quantity only.

Interestingly, the second common reason was the *Banquets* ($\mu = 4.79 \pm \text{StD} = 2.160$, $t\text{-value} = 6.313$, $p < 0.000$). Although women believed the banquets during Ramadan were a crucial reason for generating food waste, their culture in that season forced them to host banquets. At these banquets also, their traditions forced them to cook various kinds of foods with reasonable amounts to honour their guests. In this regard, the Egyptian-oriented media in Ramadan mainly focuses on the banquets. This theme has been developed from the rewarded blessing of the god when relatives meet each other especially in Ramadan. Then, the idea of family gatherings turned into banquets. After that, banquets became the theme of Ramadan's advertising. Therefore, changing the women's behaviour

in banquets is the government and businesses' responsibility to change the extreme collectivistic culture in that month.

In addition, women revealed that the third reason for the increase in food waste during Ramadan was their *unplanned purchases* ($\mu = 4.65 \pm \text{StD} = 2.256$, $t\text{-value} = 4.947$, $p. < 0.000$). These unplanned purchases are stimulated by the stores (Businesses) through many tactics inside the store. For example, the layout forced customers to watch more unneeded products. Shelf arrangement to create fake preferences. Entry and exit different gates force customers to have a journey inside the store, which ends up at the teller before the exit gate. An embarrassed feeling may be initiated when a customer stays in the queue and then does not pick any item to pay for because other customers feel s/he delayed in the queue. In fact, s/he is like a rat in a "negative emotion" trap and does not find any other way to exit. Accordingly, the store's responsibility is much accounted for the unplanned purchases.

Moreover, women reported their *lack of experience* as a reason to generate food waste during Ramadan ($\mu = 4.58 \pm \text{StD} = 2.275$, $t\text{-value} = 4.350$, $p. < 0.000$). In Ramadan, where fasting all day is obligatory, women try to meet the expectations of their fasting families at the breakfast meal. Hence, they tried new and creative food items, quantities, and recipes. A novelty seeking in cooking with a low level of experience generated food waste, especially in Ramadan, when alternatives to new foods must exist to fill the hungry ones.

Finally, the *exaggerated feeling of hunger* was the fourth reason for generating the food waste ($\mu = 4.42 \pm \text{StD} = 2.195$, $t\text{-value} = 3.273$, $p. < 0.001$). The feeling of exaggerated hunger during Ramadan is normal and scientifically reasoned. While people fast, the Ghrelin Hormone produces much more than the normal day of eating. This Hormone is responsible for inducing the feeling of hunger, especially at the normal time of meals. For instance, a normal daily 3 meals are distributed during the day morning, afternoon, and evening. During Ramadan, fasting lasts from sunrise to sunset. Hence, the three normal times are replaced with two new times, one at sunset and one before sunrise, at night. So, during the morning, afternoon, and evening the feeling of hunger is significantly increasing. To fulfil this feeling, people overeat at the two meals in Ramadan.

This eating requires cooking too much quantity and variety of foods. That, eventually, increases the food waste.

Surprisingly, women saw that the *food banks*, which accept only untouched food, and it should be from organizations, not individuals, were not significantly related to the food waste in Ramadan ($\mu = 3.96 \pm \text{StD} = 2.127$, $t\text{-value} = -0.331$, $p. > 0.05$). This can be due to the lack of awareness about the role of food banks. As well as, most of the families reused the food instead of donating it to the food bank. In addition, there was a limited effort from food banks to promote their initiatives. For instance, the Egyptian Food Bank website was fairly poor and had no way to contact its CEO. In addition, the researcher tried to interview him/her, but the one-way communication prevented this. Accordingly, as the needy people needed food, and the food bank attempted to contribute to solving this issue, the food bank was responsible for collecting untouched food from the households.

Finally, it is worth noting that, in *developing countries*, where the waste management and recycling system is very limited, people may give the food bank their trash and spoiled food. Therefore, food banks may not try to contact households directly to receive their donation. However, technology can solve this issue by getting the customer's information and contacting him/her when the food bank discovers the spoiled food. In addition, collecting the food from the households is costly. However, centralized fixed branches can solve this issue by receiving untouched food, checking it, and then distributing it among the needy people in the same neighbourhood.

Apart from the abovementioned reasons, women significantly rejected the following reasons for increased food waste, namely, *Eating leftovers is not accepted in their families*, *non-edible food components*, the *unclear expiration date*, and the *inability to prepare a recipe* from untouched food nor the leftovers, the *unacceptance rate from the underprivileged* people to the leftovers. To this end, the management practices to fight food waste in Ramadan may vary, as in table 5-15.

Table 5-15, Food waste management awareness in Ramadan

Food waste management awareness	Descriptive statistics		Test Value = 4			
	Mean	StD	Mean Difference	t	df	Sig. (2-tailed)
I keep the leftovers in the fridge and eat them before is expiry	5.87	1.605	1.872	20.139	297	.000
I understand the economic consequences of the food waste	5.86	1.636	1.861	19.579	295	.000
I understand the societal consequences of food waste	5.82	1.676	1.824	18.725	295	.000
I separate the edible food waste from non-edible food waste	5.78	1.773	1.781	17.310	296	.000
I plan my family's food ingredients well	5.55	1.765	1.554	15.193	297	.000
I understand the environmental consequences of the food waste	5.44	1.929	1.442	12.818	293	.000
I reuse the leftovers by finding a probable recipe for it	5.10	1.944	1.101	9.771	297	.000
I donate the untouched food	4.83	2.115	.827	6.702	293	.000
I think my efforts to reduce food waste are enough	4.66	1.956	.658	5.776	294	.000
I prefer to buy from a retailer that has a disclosed food waste management policy	4.58	2.164	.579	4.612	296	.000
Usually, I prefer to gain the benefits of the discounts even if this increases the food waste	3.41	2.258	-.587	-4.490	297	.000
I feed leftovers to the animals	4.14	2.334	.135	.996	295	.320
I share leftovers with others	3.96	2.343	-.040	-.297	296	.767
I give the banquet guests their leftovers as a takeaway	3.60	2.300	-.399	-2.997	297	.003
I think companies in my country spent reasonable efforts to reduce food waste	3.47	2.183	-.532	-4.176	292	.000

As can be seen, women reported different awareness acceptance levels toward all the proposed food waste management practices. Generally, they significantly accepted 13 out of 15 proposed practices to reduce their family food waste in Ramadan as follows:

First, *keeping the food in the fridge and eating* it before its expiry was the highest accepted perceived practice that women reported ($\mu = 5.87 \pm \text{StD} = 1.605$, $t\text{-value} = 20.139$, $p. < 0.000$). This was consistency with cooking too much due to the exaggerated feeling of hunger. Consequently, leftovers could be maintained in the fridge and eaten at a late time/meal.

Second, women well understood the *economic consequences* of the food waste ($\mu = 5.86 \pm \text{StD} = 1.636$, $t\text{-value} = 19.579$, $p. < 0.000$). In this regard, women varied in understanding the economic consequences of food waste. Mostly, they reported the monetary value of their family's food waste. To some extent, this is true, but the economic value is related more to the macro (country) level, not the micro (individual) level. Hence, there was a need to create awareness about the economic consequences of food waste at the country level. This can be done through different reports of the environment and food ministries as well as food banks.

In addition, women well understood the *societal consequences* of the food waste ($\mu = 5.82 \pm \text{StD} = 1.676$, $t\text{-value} = 18.725$, $p. < 0.000$). To this end, women reported that starvations start with an individual who prefers to waste food instead of spending more time and effort to consume the needed food only. As well as, starvation can destroy the whole economy and may lead to bankruptcy, which distributes anger feelings and crime within society. Moreover, a fallen economy affects the whole people with high and low income. Additionally, in the current competitive economies, an out-of-competition economy will not have a second chance to come back. Hence, women revealed their acceptance rate of the societal consequences of food waste. This disclosure induces the responsibility to reduce food waste.

Furthermore, women significantly accepted the separation *between edible and non-edible food waste* to reduce the general generated food waste ($\mu = 5.78 \pm \text{StD} = 1.773$, $t\text{-value} = 17.310$, $p. < 0.000$). In this regard, one of the most important tactics that women were aware about to reduce food waste and the source separation between edible and non-edible food waste. This separation helped reduce the edible food waste in the future. As well as the amount of edible food waste that can be reused, recycled, landfilled, or donated.

Moreover, women reported their *ability to plan* their family food ingredients well ($\mu = 5.55 \pm \text{StD} = 1.765$, $t\text{-value} = 15.193$, $p. < 0.000$). However, their acceptance of those items did not necessarily mean that they did not waste the food. Instead, they will plan the ingredients with excess food amount due to the exaggerated feeling of hunger or the fearing of less quantity. Hence, a risk-averse financial metaphor could justify their excess ingredient planning.

In addition, women significantly accepted their understanding of the *environmental consequences* of food waste ($\mu = 5.44 \pm \text{StD} = 1.929$, $t\text{-value} = 12.818$, $p. < 0.000$). Among the reported environmental consequences, one notable impact is the increase in gas emissions resulting from landfilling. In fact, this happens in most developed countries that have waste management systems. However, in underdeveloped economies, such as most Muslim countries, the waste management system is not widely distributed. Hence, the accumulated food waste in particular areas causes environmental problems and, in turn, viruses such as COVID-19. Accordingly, the environmental consequences, like the societal consequences, can impose the reasonability feeling that reduces food waste.

Moreover, one of the reported ways to reduce food waste is *untouched food donation* ($\mu = 4.83 \pm \text{StD} = 2.115$, $t\text{-value} = 6.702$, $p. < 0.000$). With respect, food donation is not as much recognized as it should be due to the lack of facilities/ways of donation. Usually, women do not think that the lack of donating their food waste to the food banks is the reason for the food waste mentioned. This leaves women with informal ways of donations, such as the doorstep of needy people and cleaners. Some of the women reported that they donated their family's food waste to the security guard "doorkeeper" and his/her family. Although this informal way of donation can reduce food waste, it is not as efficient as the food banks' donations. Hence, this confirms the role of food banks in managing and maintaining awareness of their role in society.

Additionally, women slightly considered their *efforts to reduce* the food waste as enough ($\mu = 4.66 \pm \text{StD} = 1.956$, $t\text{-value} = 5.776$, $p. < 0.000$). However, the mean score of this item was just exceeded the neutral value of 4 by only 0.66 on a 7-point Likert-type scale. Along with a variation coefficient of ($\text{STD}^2 = 3.8$),

not all women strongly accept this item. However, their perceived reasonable efforts could reduce food waste if they are maintained and publicly rewarded by the government and businesses.

Moreover, the last positive perceived strategy to reduce food waste was the preference of buying from retailers that had a *disclosed food waste management policy* ($\mu = 4.58 \pm \text{StD} = 2.164$, $t\text{-value} = 4.612$, $p < 0.000$). Hence, this perception should be reflected and well promoted to include the food waste management policy disclosure in the competitiveness criteria among the retailers. This criterion can be enhanced and well-sponsored by the governments.

In addition, women significantly disagreed on *gaining the benefits of the discounts even if they will increase* food waste ($\mu = 3.41 \pm \text{StD} = 2.258$, $t\text{-value} = -4.49$, $p < 0.000$). This means they were mature enough and clearly understood the economic, societal, and environmental consequences of generating food waste. These feelings during Ramadan month, while they were fasting, were induced by thanking god for his blessings of money, food...etc. Hence, businesses should clarify in their food products offers the exact family member that can benefit from this offer in order not to waste the food.

On the contrary, the other two non-significant ways that were related *to feeding the leftover to the animals* ($\mu = 4.14 \pm \text{StD} = 2.334$, $t\text{-value} = 0.996$, $p > 0.05$) and *sharing that leftover with others* ($\mu = 3.96 \pm \text{StD} = 2.343$, $t\text{-value} = -0.297$, $p > 0.05$). First, feeding the leftovers to the animals entails the pet's existence. Up to the researcher's knowledge, raising pets (e.g., dogs) in Muslim families was not welcomed due to some religious beliefs. In addition, pets in these countries are only affordable to high social class with high income. Hence, the limitations of raising pets inside Muslim households prevent feeding them the leftovers.

Moreover, sharing the leftovers with others was not welcomed for two reasons, namely, hygiene concerns and social desirability. With regards to hygiene concerns, this data was collected during the peak of the COVID-19 pandemic in 2020, which originates from the food market in Wuhan, China. Hence, people all over the world have become more cautious about getting food with respect to hygiene concerns. In addition, in a collectivistic culture, it would be more acceptable if people share their stuff. However, with regard to food, people

consider eating others' leftovers as humiliating, and for sure, they do not accept it. Hence, people do not like to share their leftovers with others.

Similarly, women negatively perceived some of the proposed food waste management practices, such as *giving leftovers to the banquet guests* ($\mu = 3.6 \pm \text{StD} = 2.3$, $t\text{-value} = -2.997$, $p < 0.01$). Since the banquets became not only for relatives but also for friends and colleagues, women believed that giving their guests the leftovers of the banquets was a shame in their culture. Hence, awareness creation about this method to reduce food waste should be promoted as food sharing should be.

Finally, women significantly did not think that the *companies* in their countries were making enough efforts to reduce food waste ($\mu = 3.47 \pm \text{StD} = 2.183$, $t\text{-value} = -4.176$, $p < 0.000$). This confirms the shared responsibility of food waste management and supports the proposition of the consumer as a victim of the business tactics, too. This perception also entailed the role of governments to apply rules towards corporate social responsibility (CSR) at the environmental, philanthropic, and economic dimensions in the real environment. As consumers understand the fake percentages of CSR in the financial reports of the companies, businesses should be clear about their CSR efforts, maintain, increase, and most importantly, promote them among the target audience. Therefore, the needed strategies to fight the food waste can be summarized in table 5-16.

Table 5-16, Food waste needed imperatives

Food waste management awareness	Descriptive statistics		Test Value = 4			
	Mean	StD	Mean Difference	t	df	Sig. (2-tailed)
I need hygienic food-sharing regulations	5.34	1.921	1.345	12.041	295	.000
I need recipes to cook the leftover	5.23	1.995	1.228	10.626	297	.000
I need more attractive and innovative ad content to highlight the issue	5.20	1.994	1.199	10.358	296	.000
I need food bank protocol with families	5.07	2.095	1.071	8.807	296	.000
I need tips to reduce food waste	4.54	2.086	.544	4.500	297	.000

Five food waste management imperatives were reported in the study. All of them are significantly needed among the women in Muslim Families to reduce the food waste in Ramadan.

The first priority was the *hygiene issues* of the food sharing should be regulated and well organized ($\mu = 5.34 \pm \text{StD} = 1.921$, $t\text{-value} = 12.041$, $p. < 0.000$). This reflects the *responsibility* of the consumers is well perceived. However, their limited ability to reduce food waste by sharing this food prevents them from doing so. Hence, it is now clear that the shared responsibility for food waste between the consumer, business, and government is inaccurate. Only governments and businesses are responsible for it, and shifting this responsibility to the consumer is invalid. As presented, consumers are willing to reduce food waste through all channels, available and unavailable ones. Hence, the role of governments and businesses should be enhanced to reduce food waste through promotion efforts, technological facilities, regulations, and food banks. Otherwise, at least give detailed guidelines for food sharing. Accordingly, a collectivistic culture encourages consumers to act as groups.

Second, another very important way to reduce food waste was the recipes for *cooking the leftovers* ($\mu = 5.23 \pm \text{StD} = 1.995$, $t\text{-value} = 10.626$, $p. < 0.000$). This also confirms the women's readiness to reduce their food waste from themselves. Hence, the role of government and businesses is to reveal various recipes for cooking the leftovers to help the well-being people reduce food waste.

Third, it is clearly revealed that women significantly needed *more innovative and creative ad content to highlight the food waste issue* ($\mu = 5.2 \pm \text{StD} = 1.994$, $t\text{-value} = 10.358$, $p. < 0.000$). This incorporates consumer engagement in scientific-based marketing research to meet women's expectations about innovative and creative content. Businesses are responsible for that, and governments should encourage them to do so by facilitating the procedures, ranking the advertising campaigns, and giving more tax discounts to CSR activities.

Fourth, women reported their significant need for a *food bank protocol with families to donate their untouched food* to a safe and guaranteed channel ($\mu = 5.07 \pm \text{StD} = 2.095$, $t\text{-value} = 8.807$, $p. < 0.000$). Accordingly, food banks should

prepare a detailed protocol to receive families' food waste in a secure way using technological advancements, decentralized fixed locations, and cooling trucks to collect and distribute untouched food.

Finally, the last important need is related to all the aforementioned four strategies, which were the *tips* ($\mu = 4.54 \pm \text{StD} = 2.086$, $t\text{-value} = 4.5$, $p < 0.000$). Tips can be distributed over mobile phones to remind people about the importance of food waste, some statistics about the progress, how their donation behaviour boosts the economy, various recipes for cooking leftovers, and food hygiene as requested by the women in Muslim families. This, in turn, to some extent, can create and maintain the food waste issue awareness and its possible solutions.

5.3.4 Main insights of the exploratory survey:

To this end, the study insights from the exploratory survey can be summarized in Table 5-17, to achieve the third research objective: *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month). Accordingly, several insights are suggested to help in developing the conclusive survey.

Table 5-17, Main insights of exploratory survey data analysis results

Research objective	Main results	Related Insights for Conclusive Research
<i>Obj3</i> : Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month).	Most of the sample held between 2-5 banquets in the holy month of Ramadan compared to less than 1 banquet in any other month of the year. Hence, the holy month of Ramadan could be a <i>season of banquets</i> for Muslim households.	-Ramadan offers a great opportunity to study the seasonal food waste behaviour among Muslim households.
	-The lowest income categories were not reporting their extra food preparation and subsequent food waste generation. However, the <i>middle and high-income</i> - social class families reported their behaviour.	-Income can affect the food waste behaviour among Muslim households.

Research objective	Main results	Related Insights for Conclusive Research
	-The most important reasons were that women feared the increasing number of <i>unplanned guests</i> (55.14%), showed their family generosity (26.5%), and proved their <i>desired social class</i> (4.38%).	-While religious commitment appears to show family generosity, the need for social desirability exists. Therefore, the conclusive survey must include religious and social identity-related factors to predict food waste behaviour.
	-Only 2.13% represented <i>throwing it away. Distributing among the guests</i> was 0.85%, and 0.21% <i>distributed them around themselves</i> . -They significantly reject <i>sharing that leftover with others</i> -They significantly reject <i>giving leftovers to the banquet guests</i>	- Distributing the leftovers to guests is less than 1%, confirming the fear of being negatively evaluated by others.
	-90% of the sample do not follow a <i>specific eating style</i>	-Data collection can safely ignore the eating style among Muslim households.
	-Only <i>less than 10% reported the campaigns</i> that they follow	-Food waste reduction campaigns are not effective in Muslim-dominated communities.
	-36.52% <i>could not give a specific value</i> to their food waste. 14% of them reported <i>healthy values</i> . 5.22% of them reported the financial value. -women well understood the <i>economic consequences</i> of the food waste	-Food waste value is confusing. While the significant sectors does not care about the value, some reported the health and nutrition values. This means that the monetary value is not well-perceived in Muslim communities.
	-While 39.5% of the women got their food from <i>retailers</i> , 59.1% of them found their food from <i>open markets</i> on a <i>weekly basis</i> . - They significantly reject offering the leftovers to animals. - The first priority was the <i>hygiene issues</i> of the food sharing should be regulated and well-organized.	-Although COVID-19 originated from open markets in Wuhan, Muslim households still depend on open marketing to buy their food.

Research objective	Main results	Related Insights for Conclusive Research
	-There is a significant agreement on understanding the Islamic teaching regarding eating and food waste behaviour. -They significantly agree on <i>keeping the food in the fridge and eating</i> . -Women well understood the <i>societal and environmental consequences of</i> food waste.	-General awareness about food waste issues and its religious teachings are approved.
	-Food waste behaviour <i>was not significantly different</i> from <i>a pre-fasting meal to a breakfast</i> meal in the holy month of Ramadan.	-Data can be safely collected at any meal of a conclusive survey.
	-Food waste at the <i>beginning of the holy month</i> of Ramadan was not significantly more than <i>at the end</i> of the same month	-Data can be safely collected at any time during the holy month of Ramadan in the conclusive survey.
	-The most common reason for generating food waste during Ramadan was the <i>impossibility of storing the food</i> . Followed by <i>banquets</i> and <i>unplanned purchases</i> .	-Ramadan banquets is confirmed to offer the venue for food waste behaviour.

5.4 Conclusive study

5.4.1 Analysis plan

The current study begins with the sample distribution according to the women's demographic factors to pinpoint the biases in the sample. Then, descriptive statistical analysis is applied to check the quality of the data. After that, the Exploratory Factor Analysis and Full collinearity assessment are implemented to check the Common Method Bias issue. Finally, the Structural Equation Modelling is applied to test the proposed hypotheses in the conceptual model, as in figure 5–20. The data analysis of the current study aims to achieve the fourth research objective of measuring the effect of social and psychological factors on food behaviour.

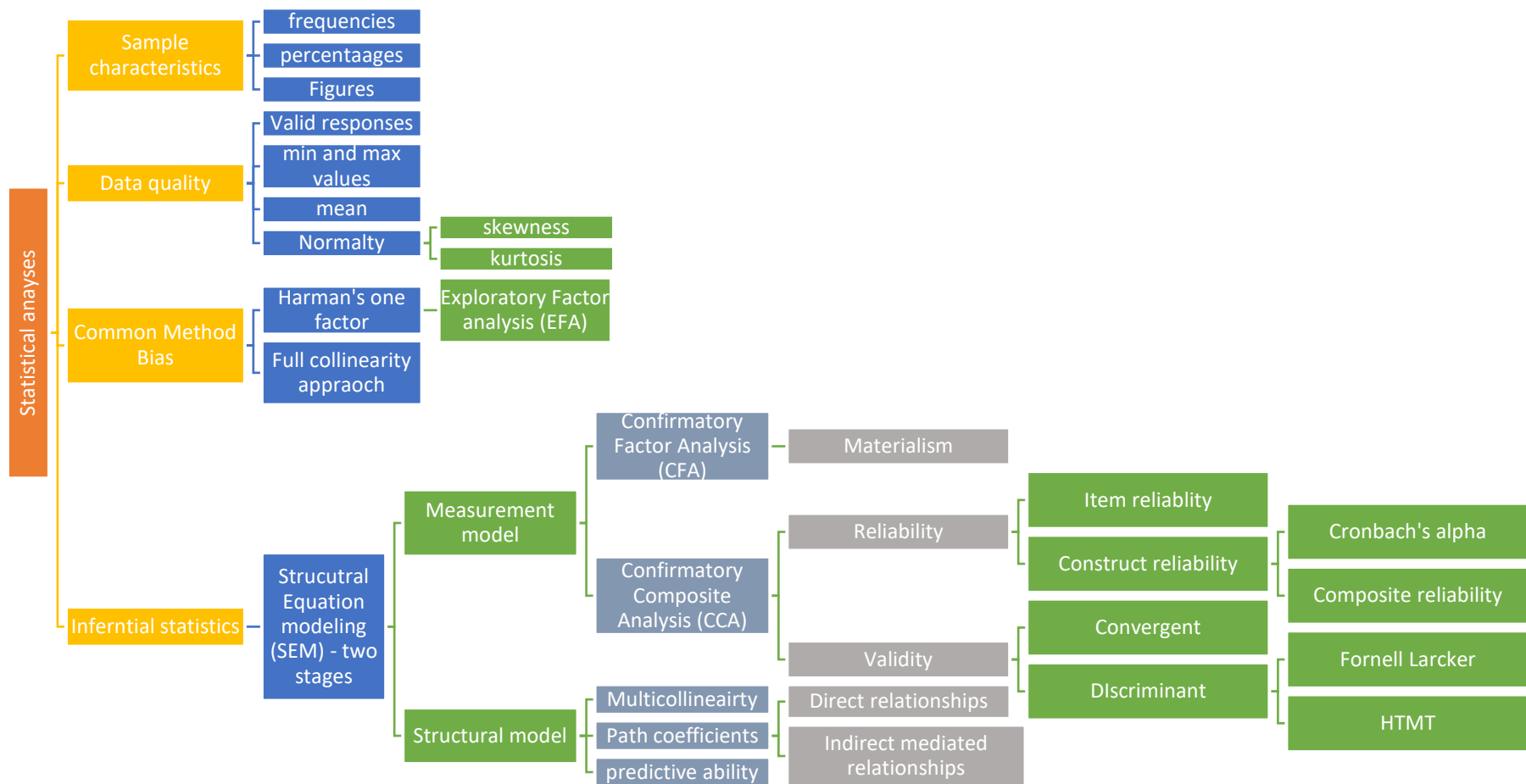


Figure 5–20, Conclusive study analysis plan

5.4.2 Sample profiling

The sample distribution can be characterized by the demographic characteristics of the surveyed women and their family demographic. In this regard, the sample profile can be explained by the woman's Marital status, Age, Education level, and Work and managerial levels as respondent demographic factors. Family monthly income, Socioeconomic status, Family living area, and Country of residency as respondent's family demographic factors.

5.4.2.1 Respondents' demographic factors

Marital status

From table 5-18 and figure 5–21, it can be concluded that almost two thirds of the sample (64.7%) were married and have children. Also, one-quarter of the sample (25.5%) were just married. While other minor categories (e.g., divorced, divorced with children, widowed, widowed with children, and singles) represent less than 10% of the sample. This shows that 90.16% of the sample were the main responsible women for preparing the food for their Muslim family. In other meaning, they are reliable sources for their family's food waste behaviour.

Table 5-18, Marital status distribution

Marital status	Frequency	Valid %
Married	153	25.5
Married with children	388	64.7
Divorced	9	1.5
Divorced, with children	19	3.2
Widowed	12	2.0
Widowed with children	9	1.5
Single	10	1.7

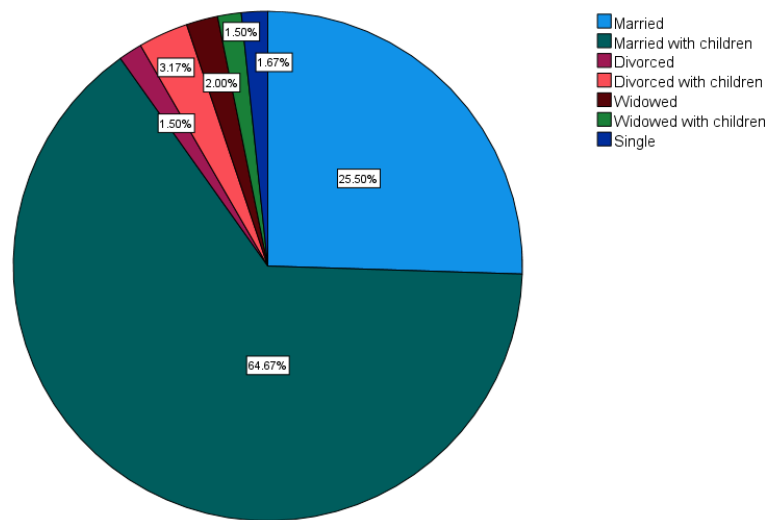


Figure 5–21, Marital status distribution

Age

As can be seen from table 5-19 and figure 5–22, the biggest proportion of the sample (43.3%) is devoted to women aged between 30 to less than 40 years old. Then, women between 20 and under 30 years old represent nearly one-third of the sample 28.8%. Then, almost one-fifth of the sample is allocated to those who are aged between 40 to less than 50 years old. Together, most of the sample, 89.83%, falls between 20 and less than 50 years old. This reflects the responsibility and rationality level of the respondents.

Table 5-19, Age distribution

Age levels	Frequency	Valid %
Less than 20	9	1.5
20 to less than 30	173	28.8
30 to less than 40	260	43.3
40 to less than 50	106	17.7
50 to less than 60	34	5.7
60 years and over	18	3.0

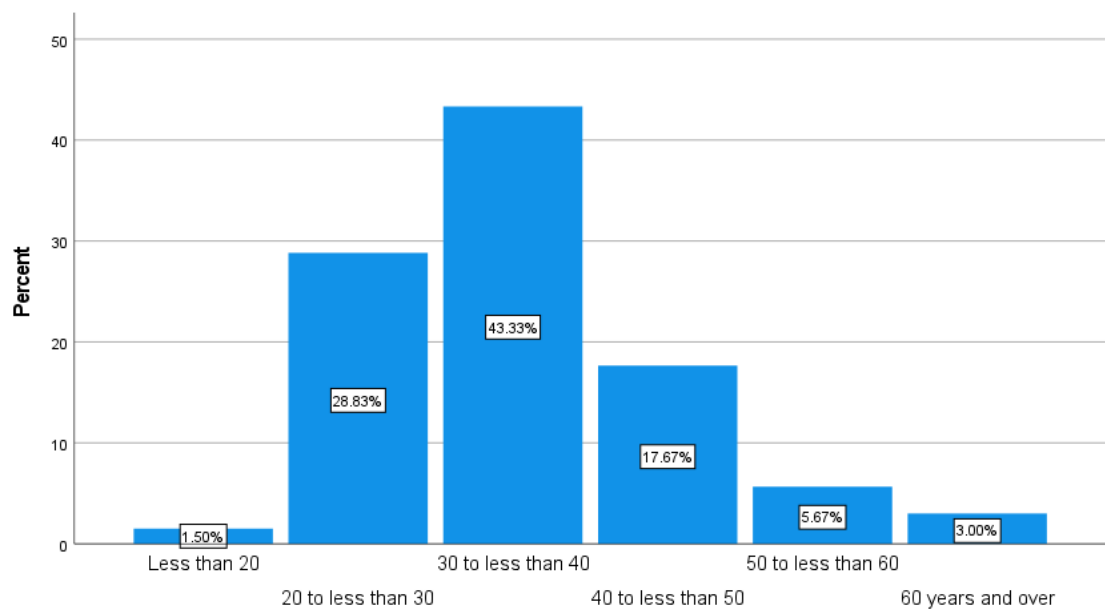


Figure 5–22, Age distribution

Education level

From table 5-20 and figure 5–23, it can be clearly seen that almost half of the sample are graduates (48.2%). Moreover, over one-third of the sample (37.3%) are postgraduates. While the education level of the high school or less represents approximately 10%, the high level of education attainment (85.5%) reflects the awareness level of food waste and religiosity issues across individual and family levels.

Table 5-20, Education level distribution

Education levels	Frequency	Valid %
Less than high school	17	2.8
High school	53	8.8
Graduate	289	48.2
Postgraduate	224	37.3
Others	17	2.8

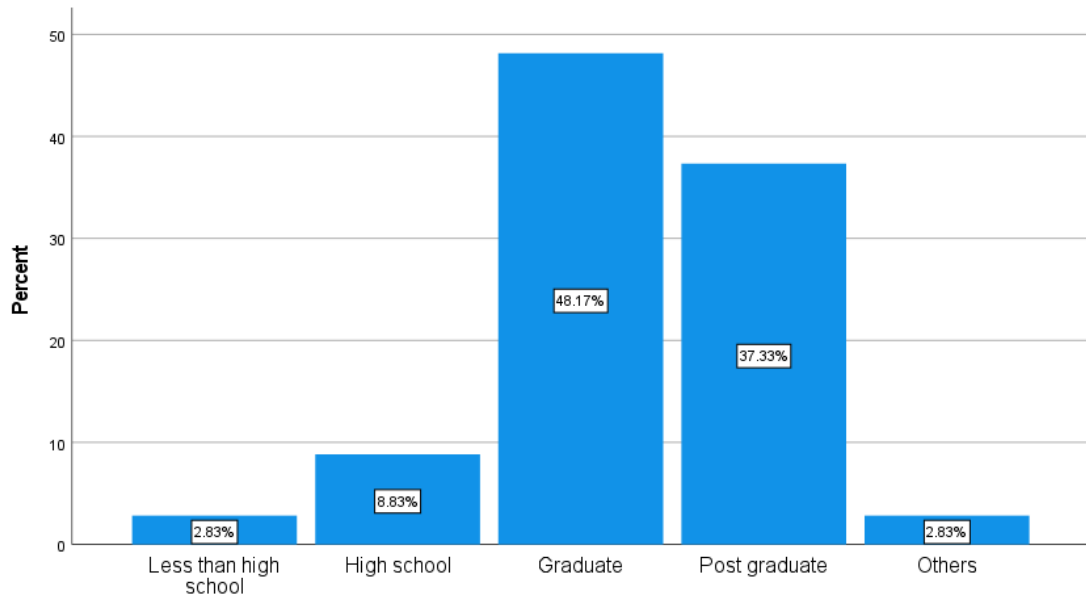


Figure 5–23, Education level distribution

Work and managerial level

The sample is almost balanced regarding the working status. With 50.6% not working (47.3% housewives and 3.3% retired) and 49.4% working, the respondent availability to the women household activities (i.e., cooking) is carefully represented. Table 5-21 and figure 5–24 represent the job status.

Table 5-21, Job and managerial level distribution

Job categories	Frequency	Valid %	Managerial levels	Frequency	Valid %
Housewife	284	47.3	Executive management	105	35.2
Retired	20	3.3	Middle management	147	49.3
Part time	88	14.7	Top management	46	15.4
Full time	208	34.7			

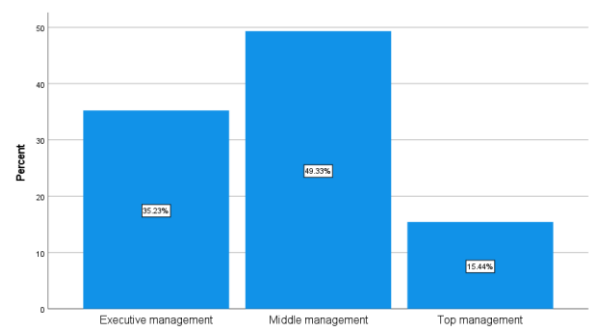
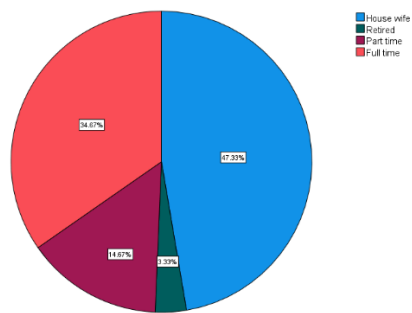


Figure 5–24, Job and managerial level distribution

More specifically, the managerial level distribution sounds practical (49.3% in middle management) for the majority of the middle-aged and graduate education level. This can be noted from table 5-22 and figure 5–25.

Table 5-22, Job level * job Crosstabulation

Managerial levels	Job categories				Total
	Housewife	Retired	Part time	Full time	
Top management	0	0	7	39	46
Middle management	0	1	40	106	147
Executive management	0	3	39	63	105
Missing values	284	16	2	0	302
Total	284	20	88	208	600

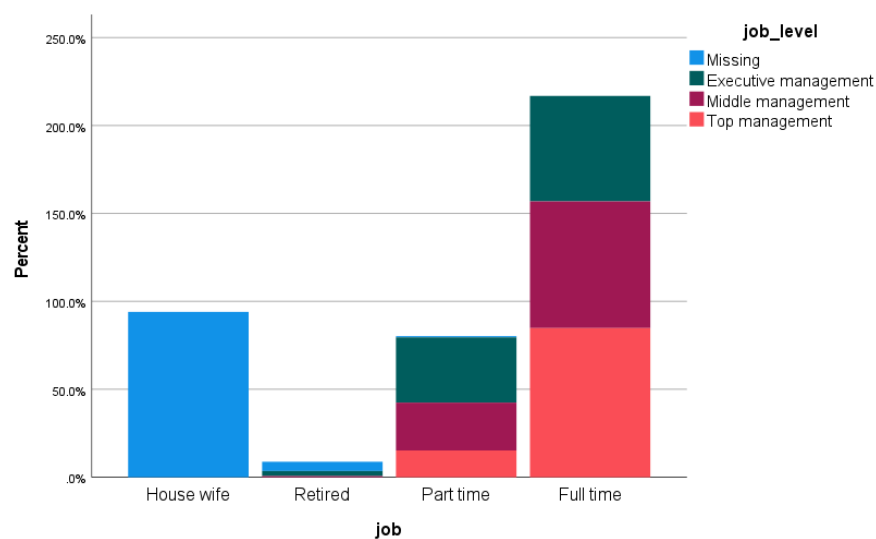


Figure 5–25, Job level * job Crosstabulation

5.4.2.2 Respondent's family demographic factors

Family income

As table 5-23 and figure 5–26 show that the sample is almost balanced across the four levels of the family's monthly income. While the biggest part of the sample is about one-third (33.7%) that is devoted to low-income families (less than \$500), the smallest proportion is almost one-fifth (18.8%) that is devoted to high-moderate income families (\$1000 to less than 15000\$). The high-income families represent only 20.8%. This reflects the coverage of the variety of the income level as the food waste behaviour may be different across the various income levels.

Table 5-23, Family monthly income distribution

Income levels	Frequency	Valid %
Less than \$500	202	33.7
\$500 to less than \$1000	160	26.7
\$1000 to less than \$1500	113	18.8
\$1500 and more	125	20.8

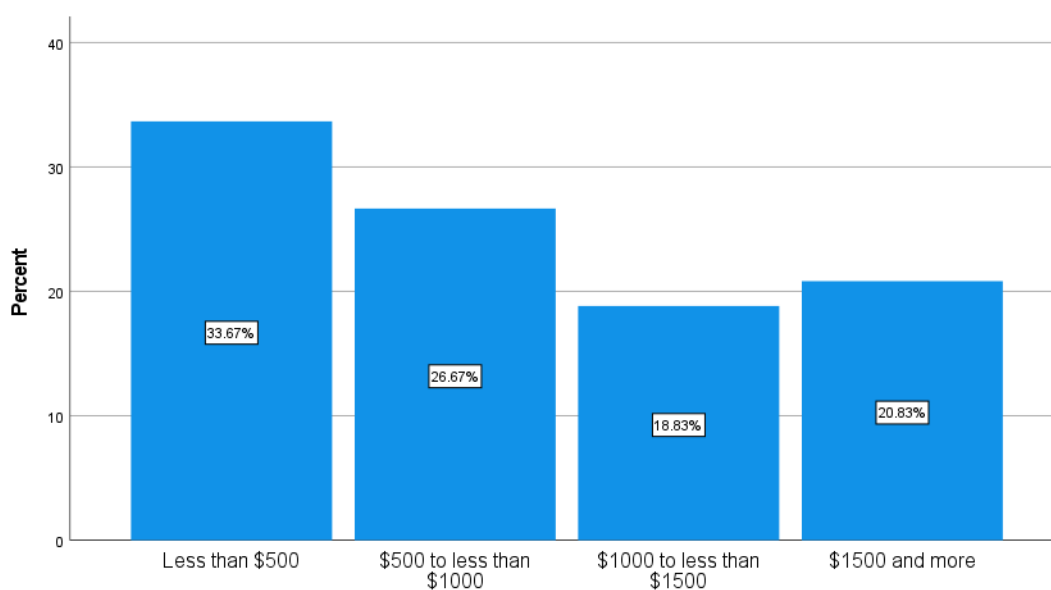


Figure 5–26, Family monthly income distribution

Socioeconomic status

The family socioeconomic status is evaluated based on the subjective Socio-Economic Status (SES) ladder that is well developed in the health, psychology (Adler et al., 2000) and marketing (Yu et al., 2016). While the lowest ladder of the step represents the people, who are the worst off, those who have the least money, least education, and worst jobs or no job, the highest step reflects people who are the best off, those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off, those who have the least money, the least education, and the worst jobs or no job. Therefore, the SES reflects the family status more than just income.

To this end, it can be concluded from the ladder ranking histogram in figure 5–27 that the sample follows the normal distribution as the violation of the skewness and kurtosis in table 5-24 is very limited, with a sample size of over 100 (Pallant, 2011; Kline, 2015). The mean score of the SES is 5.93 out of 10 ($\mu = 5.93 \pm 1.663 \sigma$). Following the normal distribution of the SES supports the current study's generalization.

Table 5-24, Descriptive statistical analysis of the family's socioeconomic status

socioeconomic status	N	Range	Mean	Std. Deviation	Variance	Skewness	Kurtosis
	600	9	5.93	1.663	2.767	-.213	.526

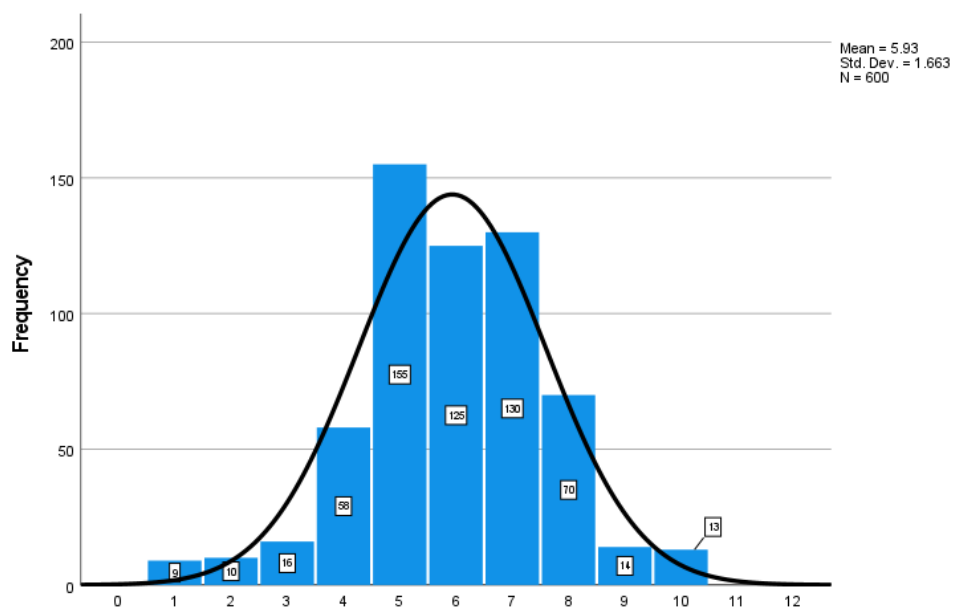


Figure 5–27, SES Ladder ranking

Family living areas

In addition to the above, the family living area of the sample was skewed to those who live in urban areas (86.7%), as in figure 5–28. This reflects the sample's ability to meet the urbanization requirements with the current lifestyle of the surveyed families, even with moderate and low monthly income levels.

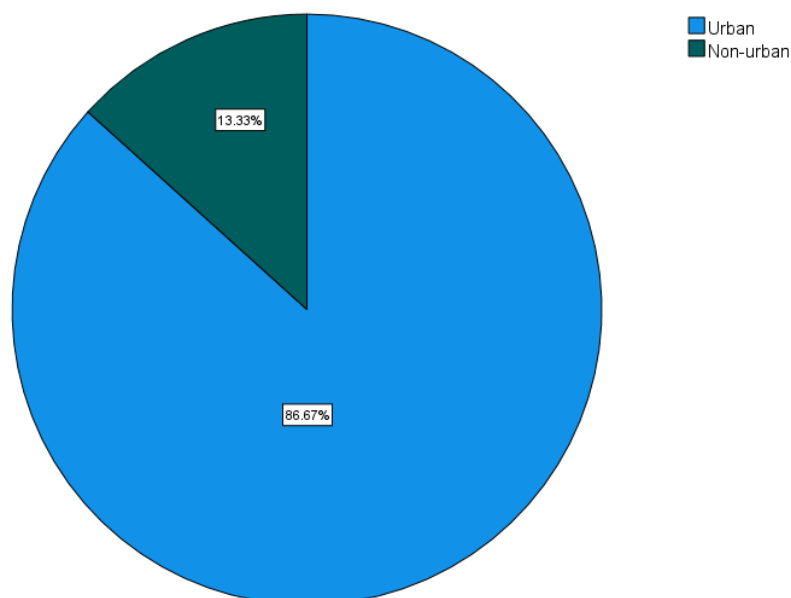


Figure 5–28, Family living area

Country of residency

A total of 24 countries are represented in the sample, as in table 5-25. While most of the sample (70.67%) was from Egypt, a Muslim country, the United Kingdom was represented by almost one-fifth (18.67%).

Table 5-25, Country of residency

Emerging economy	Frequency	Valid %	Emerged economy	Frequency	Valid %
Egypt	424	70.67	<i>United Kingdom</i>	116	19.33
Kuwait	3	0.50	<i>KSA*</i>	12	2.00
Tunisia	2	0.33	<i>UAE*</i>	8	1.33
Nigeria	2	0.33	<i>Turkey*</i>	7	1.17
Morocco	1	0.17	<i>USA</i>	7	1.17
Jordan	1	0.17	<i>Qatar*</i>	3	0.50
Brazil	1	0.17	<i>Canada</i>	3	0.50
Iraq	1	0.17	<i>China*</i>	1	0.17
Kenya	1	0.17	<i>Finland</i>	1	0.17
Syria	1	0.17	<i>Germany</i>	1	0.17
			<i>Ireland</i>	1	0.17
			<i>Italy</i>	1	0.17
			<i>The Netherlands</i>	1	0.17
			<i>Switzerland</i>	1	0.17

*Collectivistic cultures in emerged economies

In addition, countries of residency were classified into individualistic (if it>50% on an individualistic scale) vs. collectivistic (if it is <50% on an individualistic) cultures based on the 6-D Model of Hofstede culture insights database (*Country comparison*. 2010). In this regard, figure 5–29 Indicates that the collectivistic-cultural countries are the majority (78%). Hence the current study is in line with the previous research where Muslim Arabs exist in more collectivistic cultures (Al-Krenawi & Graham, 2003).

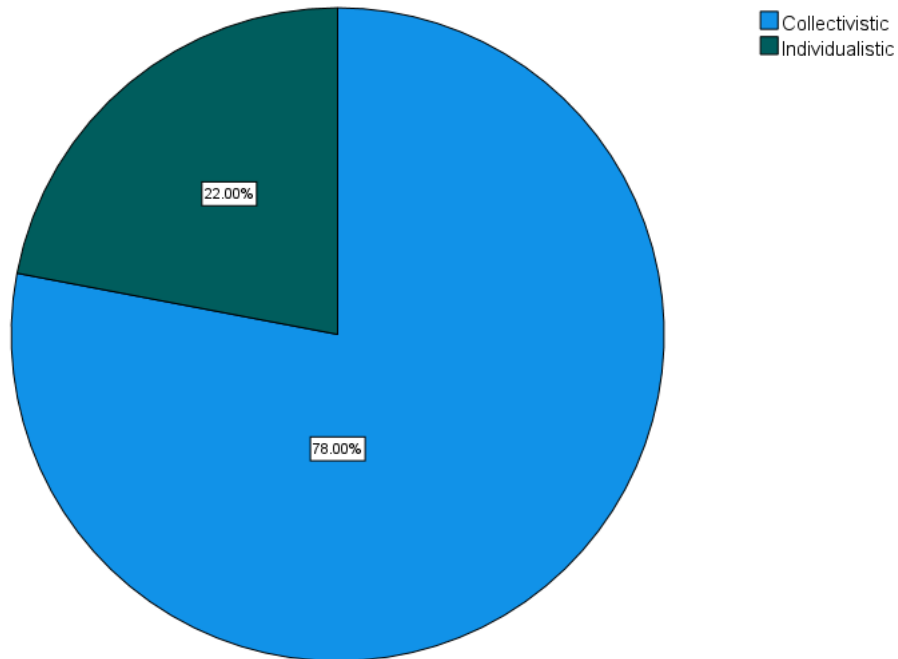


Figure 5–29, Collectivistic vs. individualistic cultures

Moreover, the surveyed families' countries were categorized into emerged and non-emerged economies as the family income in table 5-25 may reflect different economic statuses and lifestyles based on the country of residence. Table 5-25 and figure 5–30 show the 151 respondents (25.17%) were classified as emerged economies citizens based on the Gross National income per capita and income threshold over 30 years by the World Bank (*Classifying countries by income*. 2019).

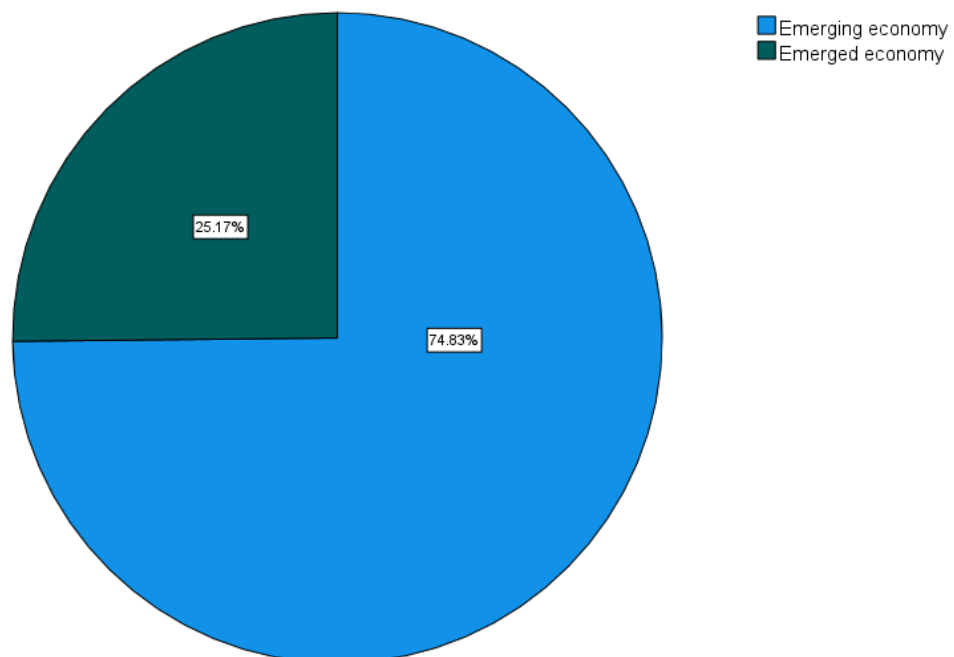


Figure 5–30, Emerged vs. emerging economies

5.4.3 Data quality checking

This section incorporates the descriptive statistical analysis of the study variables to check the data quality of the study variables and their measurement items. It begins with the number of valid observations per measurement item. Then, the minimum and maximum values are explored to ensure all values fall in the utilized Likert scales. After that, the mean and standard deviation are used to judge the central tendency and dispersion attributes. Finally, the normal distribution assumption is evaluated based on the skewness and kurtosis coefficients, as in table 5-26.

Table 5-26, Descriptive data analysis of the study variables

Variable	Measurement items*	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Food waste generation	Q12_1_a	600	1	5	3.65	1.502	-.688	-1.006
	Q12_2_a	600	1	5	3.83	1.459	-.865	-.757
	Q12_3_a	600	1	5	3.33	1.485	-.348	-1.275
	Q12_4_a	600	1	5	3.28	1.515	-.265	-1.380
	Q12_1to4_a				3.52	1.125	-.531	-.662
COVID-19 impact	Q15_1_a_r	600	1	5	3.95	1.502	-1.102	-.387
	Q15_2_a_r	600	1	5	3.86	1.521	-.961	-.668
	Q15_3_a_r	600	1	5	3.56	1.455	-.543	-1.065
	Q15_1to3_a_r				3.52	1.125	-.531	-.662
Compensation behaviour (excessive food)	Q18_1_a	600	1	5	2.59	1.505	.425	-1.276
	Q18_2_a	600	1	5	3.43	1.432	-.418	-1.126
	Q18_3_a	600	1	5	4.09	1.371	-1.265	.138
	Q18_4_a	600	1	5	2.79	1.497	.212	-1.377
	Q18_5_a	592	1	5	3.65	1.475	-.640	-1.037
	Q18_1to5_a				3.31	.833	-.290	-.662
Banquets Food waste volume	FW volume	600	1	5	3.88	1.211	-.914	-.102
Religious commitment	Q13_1_a	600	1	5	2.02	1.304	1.117	.037
	Q13_2_a	600	1	5	2.15	1.256	.857	-.349
	Q13_3_a	600	1	5	1.88	1.558	1.353	-.012
	Q13_4_a	600	1	5	2.07	1.338	1.020	-.231
	Q13_5_a	600	1	5	2.95	1.515	.024	-1.421
	Q13_6_a	600	1	5	2.02	1.385	1.133	-.096
	Q13_7_a	600	1	5	2.11	1.410	.964	-.462
	Q13_1to7_a				2.17	1.022	1.105	.390
	Q14_1_a	600	1	5	1.95	1.394	1.206	-.005

Variable		Measurement items*	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Food-related religious teachings		Q14_2_a	600	1	5	1.96	1.409	1.202	-.056
		Q14_3_a	600	1	5	1.87	1.293	1.284	.339
		Q14_1to3_a				1.93	1.285	1.197	.057
Materialism	Success	Q21_1_a	600	1	5	3.60	1.345	-.544	-.878
		Q21_2_a	600	1	5	3.04	1.375	-.041	-1.158
		Q21_3_a	600	1	5	3.63	1.355	-.604	-.831
		Q21_1to3_a				3.42	1.075	-.358	-.561
	Centrality	Q21_4_a_r	600	1	5	2.29	1.311	.701	-.662
		Q21_5_a	600	1	5	2.50	1.315	.373	-.986
		Q21_6_a	600	1	5	3.22	1.362	-.188	-1.128
		Q21_4to6_a				3.14	.894	.015	-.342
	Happiness	Q21_7_a	600	1	5	2.83	1.396	.157	-1.216
		Q21_8_a	600	1	5	2.91	1.404	.078	-1.233
		Q21_9_a	600	1	5	3.06	1.399	-.085	-1.257
		Q21_7to9_a				2.93	1.208	.095	-1.067
	Q21_1to9_a_					3.17	.885	-.064	-.640
Feeling of loneliness	Social	Q22_1_a_r ev	600	1	5	3.55	1.374	-.478	-1.053
		Q22_2_a_r ev	600	1	5	3.58	1.367	-.520	-.980
		Q22_3_a_r ev	600	1	5	3.57	1.377	-.497	-1.043
		Q22_1to3_a_r				3.57	1.254	-.490	-.889
	Emotional	Q22_4_a	600	1	5	3.27	1.415	-.260	-1.222
		Q22_5_a	600	1	5	3.37	1.466	-.342	-1.253
		Q22_6_a	600	1	5	3.77	1.533	-.840	-.881
		Q22_4to6_a				3.47	1.210	-.393	-.914
	Q22_1to6_a_					3.52	1.023	-.395	-.580

*Kindly see Appendix(D) for item coding.

As it can be seen from table 5-26, all measurement items have 600 valid observations except one item, Q18_5_a, that reflects the 5th item of the compensation behaviour, “Muslims prepare extra food for their banquets in Ramadan to impress the guests”. This is due to the oversight of enabling the mandatory option of this question on JISC before distribution. Overall, the 8 missing values can be substituted with the mean score of the valid 592 responses as missing values are less than 10% (Pallant, 2011; Hair et al., 2019). Hence, the missing values of this item will not affect the quality of subsequent analysis.

Moreover, all measurement items have minimum values of 1 and maximum values of 5. This is in line with the utilized 5-point Likert type scales (“1” strongly disagree to “5” strongly agree) for all variables except the Food waste generation that is measured by different anchors (“1” too little to “5” too much). It is worth noting that all the negative worded items (ends with _r) were carefully reversed before averaging them in their variables’ composing step.

With respect to the central tendency and dispersion, the highest and lowest mean scores are Q14_3_a, and Q18_3_a. More specifically, the surveyed sample tends to disagree with item Q14_3_a which reflects the 3rd item of the religious teachings level “In Ramadan, we invite people to our house to show our generosity since the prophet (PBUH) said, *He who believes in Allah and the Last Day let him show hospitality to his guest.*” by a mean score of 1.87 out of 5 ($\mu = 1.87 \pm 1.239 \sigma$). This suggests that, despite the importance of hospitality in Islamic teachings, this particular practice may not be widely observed or prioritized by the participants. It could also indicate a disconnect between religious ideals and actual behaviour, or the need for social identity outweighs the importance of practicing Islamic teachings in Ramadan Banquets.

On the contrary, the sample leans to agree on the 3rd item (Q18_3_a) of the compensation behaviour by preparing excessive food in Ramadan Banquets: “Muslims prepare extra food for their banquets in Ramadan to impress the neighbours.” by mean score of 4.09 out of 5 ($\mu = 4.09 \pm 1.371 \sigma$). This refers to the extent to which Muslim households at Ramadan banquets practice a cultural norm of generosity while also maintaining social harmony with their neighbours, who might be guests at these banquets. In addition, engaging in a competitive display or compensatory behaviour aimed at gaining social approval. Both extreme mean scores highlight the importance of studying Ramadan banquets, as these gatherings have evolved from a religious practice into a social tradition that plays a crucial role in maintaining and supporting social identity.

Finally, the normality assumption in the current metric data is violated since the skewness and kurtosis coefficients are not zeros. However, violating normality in social sciences is common as the sampling unit is human and cannot be controlled. Consequently, the normal distribution assumption violation will not have a serious effect on the subsequent analysis results if the skewness

coefficients range between -3:+3 and the kurtosis coefficients range between -10:+10, especially with a sample size over 100 (Pallant, 2011; Kline, 2015). In the current data, since the skewness coefficients (range from 0.015 to 1.353) and the kurtosis coefficients (range from -.005 to -1.421) within the violation boundaries, further analysis of this data will not be affected by the normal distribution violation. To this end, the Common Method Bias can be checked before testing the hypotheses.

5.4.4 Common Method Bias

With respect to the statistical analysis that will be applied after the data collection, Harman's one factor is applied to check the First-factor variance. In addition, the Full Collinearity assessment (Kock, 2015; Hair, Black et al., 2019) is applied in the Structural Equation Modelling (SEM) to check the CMB issue too, yet with different methodologies.

5.4.4.1 Harman's first-factor analysis

A Harman's first-factor analysis refers to the percentage of the explained variance of the first factor from all extracted factors variance. For instance, all interval variables that are almost measured with a Likert-type scale should be included in an Exploratory Factor Analysis (EFA) and run together. All measured variables will be grouped into factors. Hence, the extracted first-factor variance should be less than 50% of the total variance of all extracted factors (Podsakoff et al., 2003; Jordan & Troth, 2020). Table 5-27 shows a summary of the EFA results to check the CMB issue.

As can be seen from table 5-27, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.906, which is more than 0.6, as well as the Bartlett's Test of Sphericity ($df = 6670$) $\chi^2 = 12522.953$, p . value = 0.000 which is significant at confidence level 99.9%. Hence, the sample adequacy measures confirm the validity of the analysis (Field, 2009; Pallant, 2011). To this end, the current 37 measurement items have been extracted on 8 factors with 64.407% total variance. The first factor variance is only 10.409% which is less than 50% of the total variance. Hence, the CMB is not an issue in the current research.

Table 5-27, CMB evaluation using EFA

KMO and Bartlett's Test						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.						.906
Bartlett's Test of Sphericity			Approx. Chi-Square			12522.953
			df			666
			Sig.			.000
Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.409	28.132	28.132	10.409	28.132	28.132
2	4.130	11.161	39.292	4.130	11.161	39.292
3	2.498	6.750	46.043	2.498	6.750	46.043
4	1.931	5.219	51.261	1.931	5.219	51.261
5	1.445	3.907	55.168	1.445	3.907	55.168
6	1.214	3.281	58.449	1.214	3.281	58.449
7	1.195	3.230	61.679	1.195	3.230	61.679
8	1.009	2.728	64.407	1.009	2.728	64.407
9	.983	2.658	67.065			
10	.983	2.658	67.065			
11	.913	2.466	69.531			
12	.862	2.329	71.861			
-	-	-	-			
-	-	-	-			
37	.108	.292	100.000			
Extraction Method: Principal Component Analysis.						

Moreover, following the Full collinearity assessment approach, the CMB can be assessed within the Structural Equation Modelling approach context. By drawing each construct as an endogenous variable and all other constructs as exogenous, the CMB can be assessed through the Variance Inflation Factor, which should be less than 3.3. A rotation method should be applied to all constructs, and the VIF should be obtained for each round of rotation (Kock, 2015; Hair, Black et al., 2019). Table 5-28 shows that the VIFs between each pair of possible exogenous variables directed toward a rotated endogenous variable range between 1.038 and 1.84 which is less than 3.3. Hence, the full collinearity assessment confirms the lack of the CMB issue in the current dataset.

Table 5-28, Full collinearity assessment

VIF	Centrality	Emotional loneliness	Food waste behaviour	Happiness	Religious commitment	Social loneliness	Success
Centrality		1.84	1.651	1.556	1.198	1.208	1.53
Emotional loneliness	1.233		1.187	1.207	1.183	1.07	1.196
Food waste behaviour	1.069	1.04		1.055	1.086	1.024	1.044
Happiness	1.42	1.589	1.504		1.18	1.236	1.566
Religious commitment	1.059	1.04	1.063	1.07		1.067	1.038
Social loneliness	1.116	1.014	1.096	1.139	1.051		1.103
Success	1.432	1.706	1.693	1.588	1.359	1.1	

5.4.5 Structural Equation Modelling

The current study conceptual model includes one-way direct and indirect relationships. In addition, the current study utilized latent variables that are measured by multi-item scales. Therefore, the Structural Equation Modelling (SEM) is preferred than the linear regression modelling (Malhotra, 2010; Kline, 2015; Hair, Black et al., 2019). Accordingly, the SEM can be applied either by the Covariance-Based SEM (CB-SEM) or Partial Least Squares SEM (PLS-SEM).

While the CB-SEM aims to test, compare, or confirm the prior theory, the PLS-SEM aims to extend the pre-established theoretical frameworks. For instance, the PLS-SEM aims to predict the final outcome variable by maximizing the variance, while the CB-SEM aims to test the model fitness with the data by Goodness of Fit (GoF) indices. Moreover, the PLS-SEM can easily deal with various measurement levels, such as Low-order Constructs (LoC) and High-order Constructs (HoC), while the CB-SEM cannot. In addition, the PLS-SEM, as a non-parametric technique, has no requirements with the main assumptions of the parametric analysis, such as missing values, sample size, and normality, while the CB-SEM is very strict regarding these assumptions (Hair et al., 2011; Hair et al., 2014; Hair, Black et al., 2019; Hair, Risher et al., 2019; Sarstedt et al., 2020). Therefore, the current research applies the PLS-SEM in testing the proposed relationships in the conceptual model. As well as, it applies the CB-SEM in deciding the measurement levels of the materialism variable.

5.4.5.1 PLS-SEM

The PLS-SEM in the current study utilizes the two-stage approach. While the first stage aims to build the measurement model, the second stage's objective is to test the structural model (Hair et al., 2014). In this regard, the first stage applies the Confirmatory Factor Analysis (CFA) to determine the measurement level of materialism using AMOS v.27 software. Then, the selected measurement level of this construct will be incorporated in the Confirmatory Composite Analysis (CCA) to test model reliability and validity (Hair, Risher et al., 2019; Hair et al., 2020; Hair, 2020). After that, the structural model will be tested in terms of the multicollinearity, path coefficient, and predictive ability tests (Hair, Black et al., 2019; Hair, Risher et al., 2019; Hair et al., 2020; Sarstedt, Hair et al., 2022).

Smart PLS v.4 was used to apply the PLS-SEM (Sarstedt & Cheah, 2019; Ringle et al., 2022) since it has its credibility in various business-related research disciplines, such as tourism and hospitality (do Valle & Assaker, 2016; Usakli & Kucukergin, 2018; Faizan et al., 2018), Management (Hair et al., 2012), Knowledge management and HRM (Cepeda-Carrion Gabriel et al., 2019; Ghasemy et al., 2020), SMEs and Entrepreneurship (Sarstedt et al., 2014; Manley et al., 2020), Operation research and Supply chain management (Peng & Lai, 2012; Ringle et al., 2012; Kaufmann & Gaeckler, 2015), and Marketing research (Henseler Jörg et al., 2009; Hair, Sarstedt, Ringle et al., 2012; Sarstedt, Hair et al., 2022).

5.4.5.2 Measurement model

Building the measurement model is based on various criteria of the CCA. First, it assesses the item reliability using the item loading (for reflective constructs) or item weight (for formative constructs). Then, the construct reliability is assessed via Composite Reliability (CR) and Cronbach's alpha coefficients. After that, the construct convergent and discriminant validity are judged (Hair, Risher et al., 2019; Hair et al., 2020; Hair, 2020).

To this end, the current conceptual model has five variables. Religious commitment, food waste behaviour, materialism, and social and emotional loneliness feelings. Moreover, all constructs were reflectively measured by their measurement items. Although religious commitment, food waste behaviour, social and emotional loneliness were measured in a LoC measurement level (Hair

et al., 2014), the materialism can be measured in either LoC or HoC. To decide which level is accurately measuring this construct, the CFA using AMOS v.27 is applied. Then, the selected measurement level will be used in the CCA.

The CFA is applied to compare the measurement levels for materialism based on various criteria and GoF indices. First, the valid and retained items after the deletion are preferred. Second, the model with fewer covariances between term errors is preferred. Third, the model with better GoF is better (Malhotra, 2010; Byrne, 2013; Kline, 2015; Hair, Black et al., 2019). Subsequently, the materialism measurement comparison based on the CFA can be seen in figure 5–31 and table 5-29.

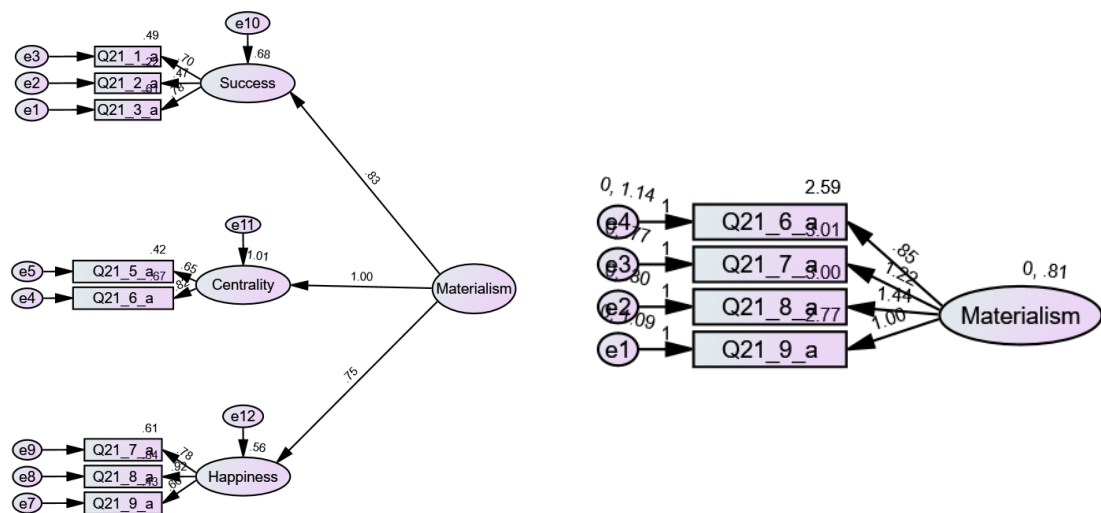


Figure 5–31, HoC vs. LoC of materialism

Table 5-29, HoC vs. LoC of materialism GoF

GoF index	HoC model (2nd order)	LoC model (1st order)
CMIN	75.118	6.238
DF	17	2
CMIN/DF	4.419	3.119
NFI	0.96	0.993
TLI	0.949	0.986
CFI	0.969	0.995
RMSEA	0.076	0.059

As it can be seen from figure 5–31, the HoC measurement level is better with the number of valid items. Moreover, with no covariance between term errors, and satisfying GoF for both models, the 2nd order model is preferred and will be used in the CCA to measure the materialism construct in a HoC reflective-reflective measurement level via three dimensions.

Consequently, the measurement model in the CCA includes religious commitment, food waste behaviour, social loneliness, and emotional loneliness as reflective LoC. Also, it includes the materialism as reflective-reflective HoCs. To this end, the two-stage disjoint approach is applied to validate the HoC of materialism in CCA. While the first stage aims to validate the low-order dimensions, the second stage aims to validate the high-order constructs from the latent scores of the validated dimensions (Sarstedt et al., 2019; Cheah et al., 2019).

To this end, the CCA begins with item reliability evaluation. The item reliability refers to the extent to which the measurement item (observed variable) is correlated with its construct. Any item with an outer loading of at least 0.708 in reflective measurement must be retained. Unlikely, any item with outer loading less than 0.4 must be removed. An item loading between 0.4 and less than 0.708 is nominated for retention (deletion) if all other items at the same construct can (not) substitute its decrease from 0.708 (Hair et al., 2014). It is worth noting that building the measurement model (LoC and HoC of materialism) is based on improving the theoretical model by removing only one item (the lowest item loading) per time. Full measurement items in the theoretical model can be found in Appendix (D). To this end, table 5-30 shows the results of the item reliability in the measurement model.

Table 5-30, Item reliability in the measurement model

Measurement items/construct	Food waste behaviour	Religious commitment	Materialism	Social loneliness	Emotional loneliness	LV - Success	LV - Centrality	LV - Happiness
Q12_1_a	0.713							
Q12_3_a	0.648							
Q12_4_a	0.845							
Q13_1_a		0.681						
Q13_2_a		0.829						
Q13_6_a		0.751						
Q13_7_a		0.725						
LV - Centrality			0.844					
LV - Happiness			0.826					
LV - Success			0.843					
Q22_1_a_rev				0.996				
Q22_2_a_rev				0.819				
Q22_3_a_rev				0.716				
Q22_4_a					0.821			
Q22_5_a					0.823			
Q22_6_a					0.777			
Q21_1_a						0.853		
Q21_2_a						0.539		
Q21_3_a						0.881		
Q21_5_a							0.848	
Q21_6_a							0.901	
Q21_7_a								0.834
Q21_8_a								0.880
Q21_9_a								0.866

As per table 5-30, the item loading for each item/latent variable score is above 0.708 except for three items: Q12_3_a, Q13_1_a, and Q21_2_a. The three items' loadings are above 0.4. Hence, they are retained as the other items at the same constructs increase in their loadings can substitute the decrease in these three items. It is important to mention that in the first model, where the materialism dimensions were measured at the first-order level, Q21_4_a_rev, Q13_3_a, Q13_4_a, and Q13_5_a were removed due to low outer loading less than 0.4.

However, Q12_2_a is removed due to low item loading between 0.4 and 0.708 but the increase in the other items at the same construct could not substitute its decrease.

In addition to the above, the construct reliability is assessed via the Composite Reliability and Cronbach's alpha coefficients to measure the internal consistency between the retained measures. A reliable construct should have at least 0.6 for each reliability test; better to be over 0.7 (Hair, Black et al., 2019; Sarstedt, Hair et al., 2022). Table 5-31 shows the results of the construct reliability.

Table 5-31, Construct reliability

Construct	Cronbach's alpha	Composite reliability
Emotional loneliness	0.733	0.849
Food waste behaviour	0.593	0.782
Materialism	0.788	0.876
Religious commitment	0.744	0.835
Social loneliness	0.894	0.886
Centrality	0.695	0.867
Happiness	0.829	0.895
Success	0.670	0.811

As can be seen from table 5-31, Cronbach's alpha coefficients range between 0.593 and 0.894. Therefore, all constructs are reliably measured by the retained items. It is worth noting that Cronbach's alpha's main drawback is its significant positive relationship with the number of measurement items. If the measurement items are less than 10 items per construct, most probably, Cronbach's alpha will be very low. On the contrary, if the measurement items are more than 10 items, most probably, Cronbach's alpha will be more than 0.7 irrespective of the construct validity (Pallant, 2011). Moreover, Cronbach's alpha supposes an equal weight to each item in the construct (Sarstedt, Hair et al., 2022). Therefore, the use of Cronbach's alpha is just an indication of internal consistency but cannot be used as the critical coefficient. Therefore, the Composite Reliability (CR) is more valid in the SEM context (Malhotra, 2010; Hair, Black et al., 2019; Sarstedt, Hair Jr et al., 2022; Sarstedt, Hair et al., 2022). To this end, since the CR ranges between 0.782 and 0.895, the study constructs are reliably measured by the retained items.

Moreover, the reliable construct validity can be checked via convergent validity and discriminant validity. First, the convergent validity measures to what extent the reliable items are closely correlated together to measure their construct. It can be assessed via the Average Variance Extracted (AVE) for each construct. An AVE of at least 0.5 supports the construct convergent validity (Hair, Risher et al., 2019; Hair et al., 2020; Hair, 2020). Therefore, as in table 5-32, the convergent validity is established for each construct as it ranges from 0.547 to 0.74.

Table 5-32, Convergent validity

Constructs	Average variance extracted (AVE)
Emotional loneliness	0.652
Food waste behaviour	0.547
Materialism	0.701
Religious commitment	0.560
Social loneliness	0.725
Centrality	0.765
Happiness	0.740
Success	0.598

Secondly, the discriminant validity measures to what extent the measurement items can distinctly measure their construct to distinguish it from other constructs in the same model (Hair, Risher et al., 2019; Hair et al., 2020; Hair, 2020). It can be assessed via the Fornell-Larker criterion (Hair, Joseph F. et al., 2014) and the new Heterotrait Multitrait (HTMT) ratio of correlations (Henseler et al., 2015; Sarstedt, Hair et al., 2022; Sarstedt, Hair Jr et al., 2022). Accordingly, the discriminant validity is established via the Fornell-Larker criterion when the AVE of each construct is higher than the squared correlations between this construct and each other construct at the same model as in table 5-33.

Table 5-33, Fornell-Larcker criterion of discriminant validity

Fornell-Larcker	Centrality	Emotional loneliness	Food waste behaviour	Happiness	Religious commitment	Social loneliness	Success	Materialism
Centrality	0.874							
Emotional loneliness	0.222	0.807						
Food waste behaviour	0.129	0.150	0.740					
Happiness	0.583	0.300	0.131	0.860				
Religious commitment	-0.053	-0.072	-0.150	-0.038	0.748			
Social loneliness	-0.066	0.250	-0.037	-0.044	-0.094	0.851		
Success	0.586	0.254	0.212	0.491	-0.210	0.046	0.774	
Materialism		0.311	0.191		-0.119	-0.054		0.837

Similarly, the discriminant validity can be established when the HTMT ratio of correlations between each construct and each other construct in the same model is less than 0.85 (Henseler et al., 2015). Therefore, since the HTMT in table 5-34 ranges between 0.055 and 0.841, the discriminant validity is established.

Table 5-34, HTMT of discriminant validity

HTMT	Centrality	Emotional loneliness	Food waste behaviour	Happiness	Religious commitment	Social loneliness	Success	Materialism
Centrality								
Emotional loneliness	0.308							
Food waste behaviour	0.192	0.216						
Happiness	0.776	0.363	0.189					
Religious commitment	0.092	0.097	0.205	0.060				
Social loneliness	0.086	0.350	0.055	0.072	0.149			
Success	0.841	0.363	0.295	0.683	0.260	0.117		
Materialism		0.407	0.268		0.157	0.078		

To this end, the reliable and valid measurement model is ready as in figure 5–32 to be incorporated into the structural model to test the proposed hypotheses.

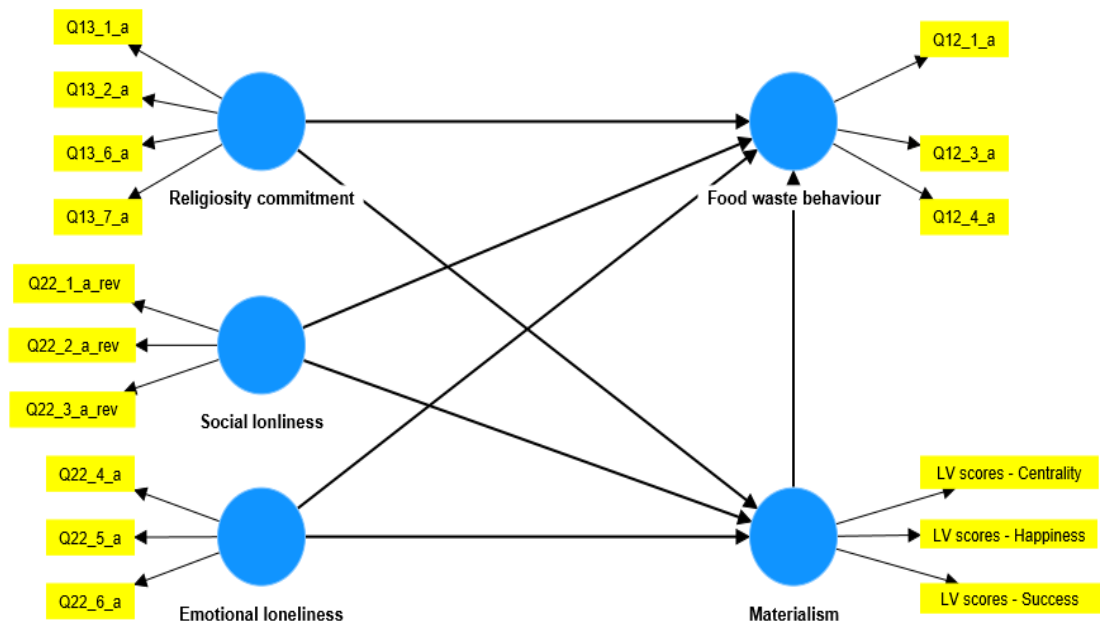


Figure 5–32, Measurement model

5.4.5.3 Structural model

After validating the conceptual model constructs, the relationship between them can be tested. Therefore, the structural model steps can be applied to test such proposed relationship, namely, Multicollinearity checking, Path coefficients, and Predictive ability (Hair et al., 2019; Sarstedt, Hair Jr et al., 2022; Sarstedt, Hair et al., 2022).

First, the Multicollinearity issue should be assessed since the current structural model has multi-independent variables. Hence, a shared effect between a pair of variables may occur. Therefore, the Variance Inflation Factor (VIF) is tested between each possible pair of exogenous variables, and it should be less than 3 to prove the lack of the issue (Hair, Black et al., 2019; Shmueli et al., 2019; Sarstedt & Cheah, 2019; Hair, 2020; Hair et al., 2020; Sarstedt, Hair Jr et al., 2022; Sarstedt, Hair et al., 2022) as in table 5-35.

Table 5-35, Multicollinearity assessment in the structural model

VIF	Food waste behaviour	Materialism
Emotional loneliness	1.202	1.069
Food waste behaviour	NA	NA
Materialism	1.145	NA
Religious commitment	1.025	1.011
Social loneliness	1.098	1.073

As can be seen from table 5-35, the VIF between each possible pair of the exogenous variables towards the food waste behaviour and materialism ranges from 1.011 to 1.02, which is less than the threshold of 3. Hence, the current structural model lacks the multicollinearity issue. It is worth noting that this multicollinearity is different from that one that is applied to test the CMB, as the latter is applied to the theoretical model, and the former is applied to the measurement model.

Second, the path coefficients in the current structural model include direct and indirect relationships. While the direct relationships can be assessed by the beta and its significance, the indirect mediated relationships can be assessed by comparing the direct and indirect betas. The direct path coefficient testing can be obtained by running the bootstrapping procedure with 10000 random subsamples with replacement in a one-tail test (except H1, which is tested in a two-tail test) as in figure 5–33 and table 5-36.

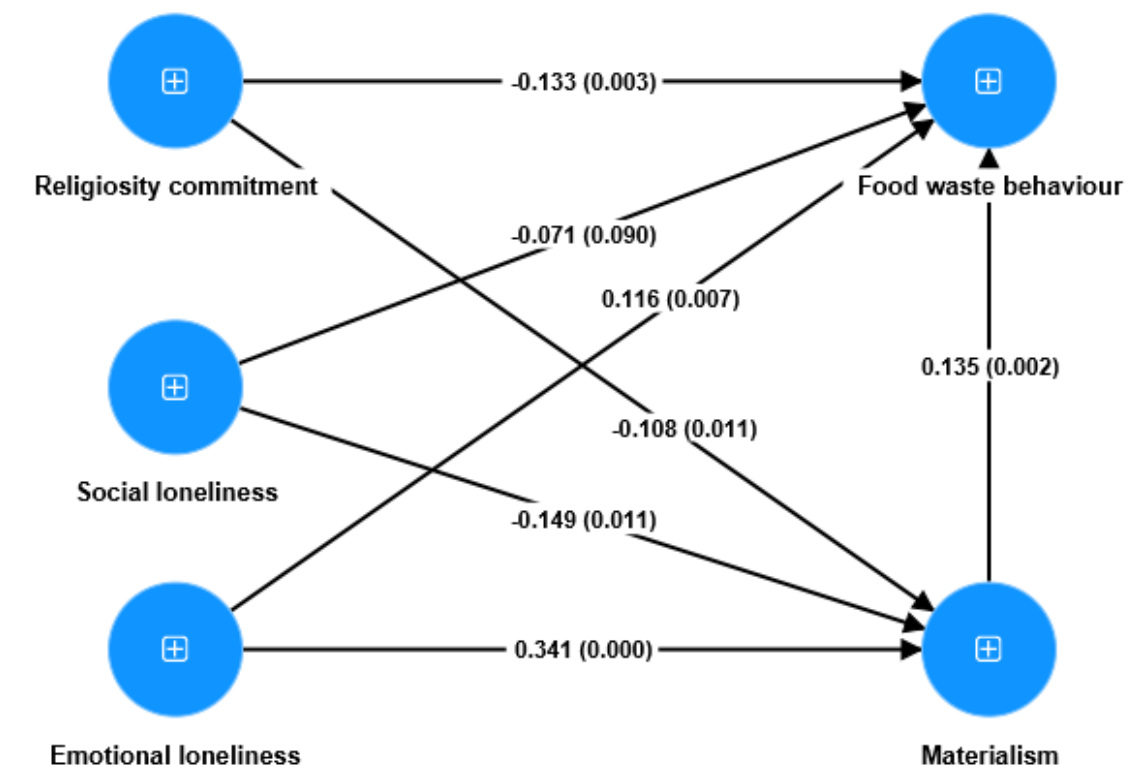


Figure 5–33, Structural model results

Table 5-36, Direct path coefficients

H	Path	β	t-value	Sig.	Confidence intervals		Result
					LCI 5%	UCI 95%	
1	Religious commitment -> Food waste behaviour	-0.133	2.800	0.005	-0.226	-0.042	Accept
2	Religious commitment -> Materialism	-0.108	2.300	0.011	-0.186	-0.034	Accept
3	Materialism -> Food waste behaviour	0.135	2.884	0.002	0.061	0.217	Accept
5a	Emotional loneliness -> Food waste behaviour	0.116	2.452	0.007	0.039	0.195	Accept
5b	Social loneliness -> Food waste behaviour	-0.071	1.339	0.090	-0.148	0.024	Reject
6a	Emotional loneliness -> Materialism	0.341	8.121	0.000	0.267	0.405	Accept
6b	Social loneliness -> Materialism	-0.149	2.299	0.011	-0.209	-0.004	Reject

As it can be seen from table 5-36, religious commitment has a significant negative effect on food waste behaviour by 13.3% at a confidence level of 99%. Therefore, H1 is supported. Similarly, religious commitment has a significant negative effect on materialism by 10.8% at a confidence level of 95%. Thus, H2 is supported. In addition, materialism has a significant positive effect on Food waste behaviour by 13.5% at a confidence level of 99%. Hence, H3 is supported.

Moreover, emotional loneliness has a significant positive effect on Food waste behaviour by 11.6% at a confidence level of 99%. Therefore, H5a is supported. However, social loneliness has a significant negative effect (instead of positive hypotheses) on Food waste behaviour by 7.1% at a confidence level of 90%. Hence, H5b is rejected. Similarly, emotional loneliness has a significant positive effect on materialism by 34.1% at a confidence level of 99.9%. Therefore, H6a is supported. However, social loneliness has a significant negative effect on materialism by 14.9% at a confidence level of 95%. Thus, H6b is rejected.

Apart from the above, the indirect mediated relationships between religious commitment, social loneliness and emotional loneliness, and food waste behaviour via materialism are evaluated based on the reconsidered Baron and Kenny approach (Zhao et al., 2010; Nitzl et al., 2016; Hair et al., 2017). According

to this approach, the mediation effect occurs when the indirect effect is significant only. A full mediation effect occurs when the direct effect is not significant. A partial mediation effect occurs when the direct and indirect effects are significant. A complementary partial mediation occurs when the direct and indirect effects have the same direction (signs). Finally, competitive partial mediation occurs when the direct and indirect effects have different signs. Table 5-37 shows the results of the mediation test. The same settings of the bootstrapping procedure (one-tail test) at the direct effect are applied to run mediation analysis.

Table 5-37, Mediation test results

H	Path	Indirect effect		Direct effect		Decision
		β	Sig.	β	Sig.	
4	Religious commitment -> Materialism -> Food waste behaviour	-0.015	0.041	-0.133	0.005	Complementary partial mediation
7a	Emotional loneliness -> Materialism -> Food waste behaviour	0.046	0.003	0.116	0.007	
7b	Social loneliness -> Materialism -> Food waste behaviour	-0.020	0.038	-0.071	0.090	

As can be seen from table 5-37, religious commitment has direct and indirect significant negative effects on food waste behaviour at a confidence level of 95%. Therefore, the complementary partial mediation effect supports H4. Similarly, emotional loneliness has direct and indirect positive effects on Food waste behaviour at a confidence level of 99%. Therefore, the complementary partial mediation effect supports H7a. Finally, social loneliness has direct and indirect negative effects on Food waste behaviour at a confidence level of 90%. Thus, the complementary partial mediation effect supports H7b.

Finally, the model's predictive ability is assessed via multiple criteria. While the predictive power of the whole model can be judged by the coefficient of determination (R^2), the predictive ability can be confirmed by the PLS-predict method (Shmueli et al., 2019; Hair et al., 2020; Sarstedt, Hair Jr et al., 2022; Sarstedt, Hair et al., 2022). In this regard, a variance coefficient of 0.25, 0.5, and 0.75 reflects weak, moderate, and strong predictive power, respectively (Hair et al., 2014). Moreover, the predictive ability can be highly confirmed if all of the PLS errors are less than the Linear Modelling (LM) errors. Also, the predictive ability can be moderately (weakly) confirmed if the majority (minority) of the PLS errors are less than the LM. Finally, the predictive relevance cannot be confirmed when all the PLS errors are higher than the LM ones. In this vein, the use of the Mean

Absolute Errors (MAE) or the Root Mean Square Errors (RMSE) is based on the shape of the residual errors of the measurement items. The current PLS-predict is applied using 10 folds ($k=10$) and 10 times ($r=10$). A normal distribution of the residual errors leads to the RMSE selection, and the non-normal distribution leads to the MAE option (Shmueli et al., 2019). Table 5-38 shows the results of the predictive ability of the whole model.

Table 5-38, Predictive ability

Endogenous variable	Measurement items	R^2	PLS-SEM	LM	PLS-SEM - LM
Food waste behaviour via MAE	Q12_1_a	0.066	1.094	1.096	-0.002
	Q12_3_a		1.236	1.231	0.005
	Q12_4_a		1.231	1.201	0.031
Materialism via RMSE	LV scores - Centrality	0.127	0.975	0.980	-0.005
	LV scores - Happiness		0.9564	0.9565	-0.0001
	LV scores - Success		0.962	0.947	0.015

As can be concluded from table 5-38, the Food waste behaviour has a weak predictive power ($R^2 = 6.6\%$), which is weakly confirmed by the PLS-predict as only the error of the Food waste behaviour items is less than its counterpart in the LM. However, materialism has a weak predictive power ($R^2 = 12.7\%$), which is moderately confirmed by the PLS-predict as only one error of the Food waste behaviour items is higher than its counterpart in the LM.

5.5 Chapter summary:

This fifth chapter provided a detailed account of the data analysis conducted across the three studies. It commenced with text analytics applied to the collected tweets, followed by descriptive and comparative statistical analyses of the exploratory survey data. Subsequently, the chapter discussed the testing for common method bias prior to applying structural equation modelling to analyse the conclusive survey data. The following chapter will discuss the key results of the analysis and reflect on the literature review to uncover the current research contribution.

Chapter 6 Discussion of results

“What we know is a drop; what we don’t know is an ocean”

Isaac Newton

6.1 Introduction

This chapter illustrates a detailed discussion of the statistical data analysis results within the previous literature review context. First, it begins with discussing the results of using the Food waste behaviour as a proxy for the generated food waste volume. It is structured according to each hypothesis result in order to achieve the research aim and objectives. Accordingly, the direct and indirect hypotheses testing results will be interpreted and then discussed with the previous literature. Ultimately, each result contribution to the literature will be presented. Finally, the research limitations and future research avenues are presented. To this end, this chapter can be mapped as in figure 6–1.

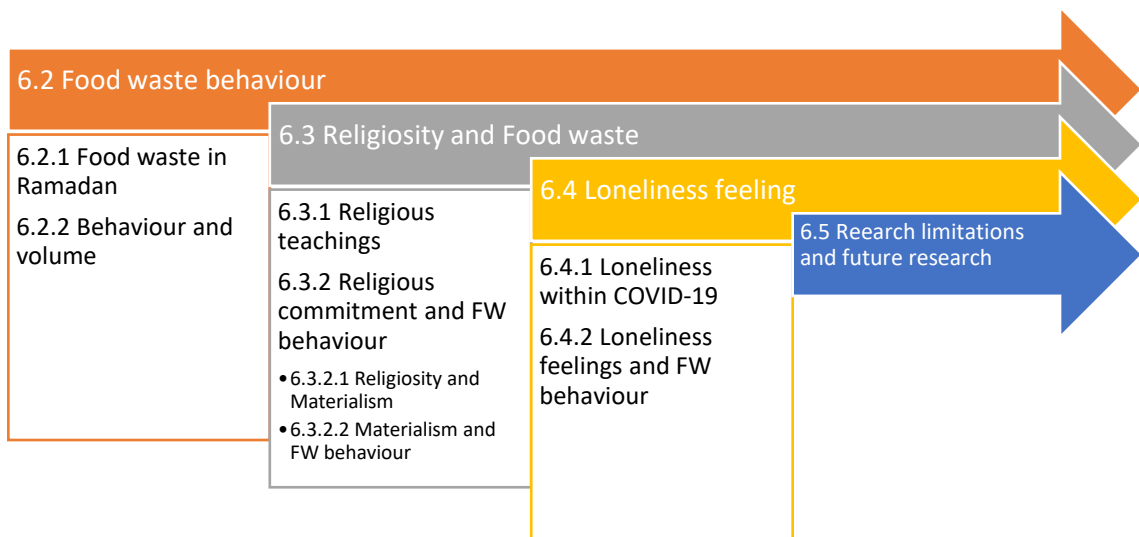


Figure 6–1, Discussion chapter map

6.2 Food waste behaviour among Muslim households

The current section shows the results of contextualizing the food waste behaviour in the holy month of Ramadan. Then, it illustrates the relationship between food waste behaviour and its generated volume.

6.2.1 Food waste in Ramadan

To begin, the paucity of literature concerning food waste behaviour during the holy month of Ramadan among Muslims derived the importance of studying Food waste behaviour within Ramadan duration. With respect to the time-based events, the holy month of Ramadan is considered the most sacred month of Islam. Such distinctiveness stimulates Muslims' positive emotions to increase their good deeds (Al-Hajieh et al., 2011), such as their prosocial behaviour (Haruvy et al., 2018). This uniqueness in Islam has been elevated due to many Islamic religious facts (Muhammad, 2018). Among them, the holy book of Islam "Qur'an" is given to the Islam prophet, Mohamed (PBUH), in this month. Also, the only month that has one night, the "night of destiny," and the praying during this night can be rewarded as 1000 months of prayers. In addition, the advisory pilgrimage "Umrah" in the holy month of Ramadan is rewarded as the compulsory one. It is also the only month that Muslims must fast during all their days, from dawn time to sunset.

More specifically, fasting the Ramadan's days is one pillar of the 5 pillars of Islam. If one denies this worship, s/he will no longer be a Muslim. Fasting these days is rewarded by Allah by clearing all sins and bad deeds of a true believer who completes the whole 30 days. In addition, a true believer who performs fasting has two times to be joyful: when s/he breaks the fasting every day at sunset and when s/he meets Allah on the day of judgement with the fasting reward. Therefore, Muslims have unique religious practices during this month. They invest their time during this month and pass the time of fasting by reading the holy book of Islam, "The Qur'an", and praying in the mosques. At night, they gather at mosques to pray for at least one hour together to gain the reward. These special prayers are called "Taraweeh". Muslims do this every year during this religious season to gain rewards. In this regard, the holy month of Ramadan can be divided into three stages: Allah blessed Muslims by Merci in the first third, by forgiveness in the second third, and by protection from hellfire in the last 10 days.

Although Muslims fast during the holy month of Ramadan to obey God's order as one of the five Islamic Pillars, it has various physical benefits to the bodies. Among them, it has been proven that fasting to increase the levels of awareness and alertness (Almeneessier et al., 2018) which supports the decision-making process (de Ridder et al., 2014), as well as it has a positive effect on the longevity (Roth & Polotsky, 2012) and various diseases (Longo et al., 2021).

To this end, the feeling of hunger for the long duration of fasting in Ramadan has unique attributes. The feeling of hunger comes in waves. These waves happen due to stimulating the Ghrelin hormone. More specifically, on a daily basis, people eat three meals. Before the routine time of eating each meal, the Ghrelin hormone is proven at the highest levels, but when a meal is eaten, the levels of the same hormone go down again. These waves follow a pattern that is created by each person according to his lifestyle (Natalucci et al., 2005). Such a pattern needs time to be changed. However, on the first day of Ramadan, Muslims are committed to changing their pattern from three waves per day to two waves, one before the sun sets and one at the night before dawn time. Hence, they feel hungry more than usual in Ramadan, especially the first days rather than the last days, to change the hormone pattern. Therefore, Muslims in the first days of Ramadan may increase their prepared food in the first days than the last days. This reflects the increase in food waste in the first days compared to the last ones. In this regard, the results of one sample *t*-test of food waste volume according to the days of Ramadan can be shown in table 6-1. A 7-point Likert-type scale (1: strongly disagree to 7: strongly agree is used).

Table 6-1, Food waste in Ramadan first and last days (exploratory study)

Descriptive statistics				Test value = 4		
Food wasting is much higher at the beginning of Ramadan compared to the last days of it	N	Mean	Std.	t-value	df	Sig. (2-tailed)
	298	3.27	2.279	-5.541	297	0.000

The result refers to the significant difference from the neutral value of 4 towards the negative direction ($\mu = 3.27 \pm 2.279$ out of 7). This means that Muslim women significantly disagree on the food waste behaviour change over time during the holy month of Ramadan. Although the result contradicts the theoretical

clue of high food waste in the first days of Ramadan rather than the last days of it, this supports the generalization of the food waste behaviour across the two meals during the whole month.

However, there are two main meals during this 30-day month: A pre-fast meal and a breakfast meal (Yoreh & Scharper, 2020). At the pre-fast meal, “Suhoor”, Muslims eat as much as they can due to their expectations of hunger during the fasting after a few minutes. Also, during the breakfast meal, “Iftar”, Muslims eat as much as they do due to their feeling of hunger as they fast more than 12 hours a day while performing their daily jobs without food or water. Muslims have approximately one hour at sunset to break their fasting and then go to the mosque to perform the special prayer, Taraweeh. Then, they sleep about 2 to 5 hours before the pre-fast meal. Then, they must fast again. Therefore, their fears of hunger or the real feeling of hunger do not make a significant difference in the exaggerated food preparation; hence, increased food waste quantity of the two meals.

Moreover, preparing an unplanned amount of food for hungry people increases food waste, which is a bad deed in the month of worship and reduces the health benefits of fasting. Muslims know that, but they prepare such excessive quantities of food (El Bilali & Ben Hassen, 2020) for many reasons, such as feeling hungry or feeding people who preserve fasting through banquets. In addition, the unusual hunger feeling makes Muslims exaggerate their food needs for their breakfast meals as they expect to eat until they have full stomachs. However, Muslims expect to eat as much as they can at the pre-fasting “Suhoor” meal due to their expectations of feeling hungry through the long hours of fasting the next day, not because of their feeling of hunger, as their stomach is still full of the breakfast meal. In both meals, an excessive amount of food is prepared, which is eventually wasted. Consequently, the amount and kinds of prepared food in the breakfasting “Iftar” (lunch on normal days) to pre-fasting “Suhoor” (breakfast meal on normal days). Consequently, the results of the paired-sample *t*-test of food waste volume according to the two meals in Ramadan can be shown in table 6-2. A 7-point Likert-type scale (1: strongly disagree to 7: strongly agree is used).

Table 6-2, Food waste in Ramadan two meals (exploratory study)

Descriptive statistics				Paired sample t-test		
Item	N	Mean	Std.	t-value	df	Sig. (2-tailed)
My family waste food for breakfast during Ramadan.	298	2.30	1.684	6.443	297	.000
My family waste the food in the pre-fasting (Sohour) meal in Ramadan	298	1.75	1.445			

As can be seen from

table 6-2, Muslim women disagree on both items related to wasting food in both meals: breakfasting "Iftar" ($\mu = 2.3 \pm 0.098$ out of 7) and pre-fasting "Suhour" ($\mu = 1.75 \pm 0.084$ out of 7). However, Women's replies on the breakfast meal food waste are significantly higher than their replies on the pre-fasting food waste. This is due to two reasons.

First, the real feeling of hunger due to fasting for long hours induces women to prepare too much food for the breakfast meal. However, in the pre-fast meal, the hunger expectations of fasting induce women to cook excessive food. At the same time as the pre-fasting, Muslims have expectations, not real feelings. Hence, these expectations differ according to the next day's work/routine. In addition, Muslims' stomachs still have food from the breakfast meal that was eaten a few hours ago, usually 5 hours on average. Hence, there is no need to cook too much food as the expectations of hunger are unstable, and the stomach has some food.

Second, with respect to the food items, the breakfast meals usually have traditional lunch meal items, but the pre-fasting meal has traditional breakfast items on non-fasting days. Hence, overeating the quantity of lunch meal items is a usual habit due to the daily work shifts from 8 to 4. However, eating too much quantity of breakfast items is not usual due to the time of the meal in non-Ramadan, usually early morning. Hence, Muslim women prepare more food for breakfast than pre-fasting meals, which is reflected in the food waste in both meals. Accordingly, studying the breakfast meals is more accurate than studying the food waste behaviour during Ramadan. In addition, Ramadan Banquets take place in breakfast meals, not pre-fasting meals, due to household privacy and sleeping times.

6.2.1.1 Food waste due to Banquets-related customs

Folklore, folklife, and folkloristic research is a well-established interdisciplinary science that is most linked to anthropology, arts, humanities, and religious sciences. It provides an arena of meaningful perspectives on food. Such venues welcome people to express their identities and beliefs to construct relationships and boundaries (Al-Hajieh et al., 2011). Consequently, the holy month of Ramadan has an exclusive folklore to Muslims worldwide, namely, Banquets. Such banquets can significantly increase the food waste quantity that is sufficient to feed the whole population of one city (Elmenofi et al., 2015; Baig et al., 2019). In addition, Ramadan's banquets are considered as the second reason to waste food in that blessed month as in table 5-14.

During Ramadan, Muslims ask the forgiveness by investing their time, effort, and money in good deeds (Al-Hajieh et al., 2011). These good deeds can be divided into self-awarded worshipping and others-awarded worshipping by serving others in a prosocial behaviour (Haruvy et al., 2018). Also, good deeds take place individually or in a private or public manner. Accordingly, Muslims fast during the holy month of Ramadan without drinking or eating anything and pray long-night prayers to reward only themselves/themselves in both public and private situations. Muslims also try to feed needy people in their homes by increasing charity or conducting huge breakfasting "Iftar" tents (i.e., The merciful god tables) to feed needy public people. Such breakfasting tents need professional chefs to prepare huge amounts of food within a limited time every day during the whole month of Ramadan. Finally, the Islamic teachings encourage Muslims to tighten their relationships with relatives, neighbours, and friends, especially during Ramadan, to gain the rewards of fasting. Hence, Muslims prepare banquets within their homes to host people they need to tighten their relationships within Ramadan more than any month of the year, as in table 6-3.

Table 6-3, Banquets in Ramadan and non-Ramadan months (conclusive study)

Descriptive statistics	Ramadan banquets	Other months banquets
Mode	2	10

As can be seen from table 6-3, the mode of the responses in Ramadan is 2, which reflects the common minimum number of banquets in Ramadan. However, in the rest of the year, the mode of the number of banquets is 10, which is less than 1 banquet per month over the rest of the 11 months of the year.

Moreover, the banquets that are conducted inside houses target relatives, friends, or colleagues, not needy people. Therefore, the food items and quantity must reflect the generosity perspective. Such generosity depends on the closeness of the guests to the host. In this regard, As can be seen from table 6-4, more than half of the invited guests to Ramadan banquets are very close relatives (57.4%), then the friends and colleagues 23.7%, and finally, the extended family 18.8%. This means that Muslims try to tighten their relationship with their very close relatives, who are mostly limited members. Then, Muslims try to balance between their friends/colleagues and extended family members as there are too many. This distribution is quite reasonable as one household should invite who can be fed by the Banquets. Such a household has one wife, and her kitchen is limited to preparing too much food for too many people. She already prepares excessive food quantities of various items for her banquets (Elmenofi, et al., 2015).

Table 6-4, Ramadan's banquets guests (conclusive study)

Guest's types	Responses		Percent of Cases
	N	Per cent	
(Immediate family / very close relatives)	469	57.4%	78.2%
(friends and colleagues)	194	23.7%	32.3%
(extended family / Relatives)	154	18.8%	25.7%
Total	817	100.0%	136.2%

Moreover, there are various reasons behind preparing excessive food in the Ramadan banquets as in table 6-5.

Table 6-5, Main drivers of excessive banquets food (conclusive study)

Descriptive statistics				Test value = 3		
Items	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
impress the neighbours	600	4.09	2.256	19.418	599	.000
impress the guests	592	3.65	2.224	10.674	591	.000
overcome the feeling of loneliness by connecting to others	600	3.43	2.160	7.269	599	.000
accommodate the additional guests that invited guests may bring along (including extended family members, neighbours, etc.)	600	2.79	2.195	-3.382	599	.001
show the family's generosity	600	2.59	2.275	-6.725	599	.000

As can be seen from table 6-5, the highest mean score among all the five reasons for preparing excess food is to impress the neighbours ($\mu = 4.09 \pm 1.37$ out of 5), impress the guests ($\mu = 3.65 \pm 1.475$ out of 5), then to overcome the feeling of loneliness by connecting to others ($\mu = 3.43 \pm 1.432$ out of 5). Moreover, the Muslim women's responses are neutral towards the generosity-related items, accommodate the additional guests that invited guests may bring along (including extended family members, neighbours, etc.) ($\mu = 2.79 \pm 1.497$ out of 5), and explicitly show the family generosity ($\mu = 2.59 \pm 1.505$ out of 5).

Although excessive banquet food is stimulated by various drivers, it increases the food waste of these banquets. However, their social status outweighs their religious commitment since they prefer to impress the neighbours and guests or overcome the loneliness feeling, more than showing the family generosity. In other words, the first three reasons for hosting the banquets are non-religious reasons, while the last two reasons share religious and psychological perspectives. Therefore, it can be clearly seen that the study has achieved the third research objective: *Obj3*: Understand the unique characteristics of the food waste behaviour of Muslim families during seasonal context (e.g., Ramadan month). Consequently, it gives insights into studying the conflict between the religious and social identity-related factors in deriving food waste, as in the fourth research objective: *Obj4*: Measure the effect of social and

psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan.

However, it is important to highlight that studying food waste requires Muslim households to waste food while data collection or remembering last year's food waste volume during the Ramadan banquet, which is challenging. Therefore, following the theory of reasoned action, the next section shows the results of Muslim households' self-reproduced food waste volume of Ramadan banquets on a 5-point Likert scale (1=too little to 5=too much) before predicting the food waste behaviour using the intention to commit it.

6.2.2 Food waste behaviour and volume

To begin, the Muslim women agreed on their reasonable amounts of generated food waste from the hosted banquets in Ramadan, as in table 6-6.

Table 6-6, Banquets food waste volume (conclusive study)

Descriptive statistics				Test value = 3		
Items	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
FW volume	600	3.88	1.211	17.873	599	.000

The banquet food waste quantity is generated even though Islamic teachings are against this unsustainable behaviour (El Bilali & Ben Hassen, 2020). In addition, Ramadan and fasting worshipping maximize the guilt feeling toward wasting food, especially when needy people fast as well. To this end, the main drivers of food waste increase in Ramadan banquets are summarized in table 6-7.

Table 6-7, Banquets' Food waste drivers (conclusive study)

Descriptive statistics				Test value = 3		
Reasons	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
It has been damaged or moulded (e.g., the stale bread stored in the fridge or cupboards)	600	3.83	1.459	13.937	599	.000
It has passed the best-before stamped date	600	3.65	1.502	10.653	599	.000

Descriptive statistics				Test value = 3		
Reasons	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
I had leftovers and I had not used for another meal	600	3.33	1.485	5.497	599	.000
I cooked more than I needed, and I have not used it for another meal	600	3.28	1.515	4.474	599	.000

As table 6-7 reports, the main reasons to generate food waste from Ramadan's banquets are the damaged stored food while in the fridge ($\mu = 3.83 \pm 1.459$ out of 5), then passing the expiry date ($\mu = 3.65 \pm 1.502$ out of 5), then the leftover is wasted if they have not been used in another meal ($\mu = 3.33 \pm 1.485$ out of 5), and finally, the explicit confession of cooking more than the banquet needs and the leftover did not consume ($\mu = 3.28 \pm 1.515$ out of 5). This means that for religious commitment, Muslim women do not usually throw their family/banquet food waste. Instead, they store it as they may need it in another meal. However, sometimes, the leftover is moulded or passed the expiry date. Hence, Muslims threw it away. In addition, although Muslims confessed their extra food preparation for the banquets, they have the intention to use it. However, as for other reasons, sometimes it is damaged. This leads to a study of the effect of the food waste behaviour on the generated food waste volume from the banquets during Ramadan.

Furthermore, following the same steps of the SEM-PLS, the food waste behaviour has a significant positive effect on the generated food waste volume by 22.6% at a confidence level of 99.9%, as in table 6-8. This supports the use of food waste behaviour as a proxy for the food waste volume in the conceptual model. Also, the effect is positive, which supports the attitude-behaviour positive relationship based on the Theory of Reasoned Action. Moreover, the positive effect is just 29%, which means 71% of the FW volume is not generated from the Banquet's food waste behaviour. This means that some Muslims prefer to utilize banquet waste instead of increasing food waste. This can be rationalized by religious commitment, especially during Ramadan.

Table 6-8, Food waste behaviour and volume (conclusive study)

Path	β	t-value	Sig.	Confidence intervals	
				LCI 5%	UCI 95%
Food waste behaviour -> FW volume	0.226	5.324	0.000	0.160	0.302

6.3 Religiosity and food waste

In this section, the relationship between Islamic teaching related to eating behaviour and religious commitment is discussed. Then, the direct relationship between religious commitment and food waste behaviour is explained. Finally, the role of materialism in mediating the same direct relationship is clarified.

6.3.1 Food waste Islamic teaching and religious commitment

Although food is the builder of the body and one of the two strategic imperatives to sustain our lives along with the water, people waste it. (Yoreh & Scharper, 2020). Moreover, the ages of food scarcity and hunger have passed due to food appreciation. However, these times may return very soon as 21000 people die every day due to the hunger crisis, while people abundance their gratitude to have such food. During the food scarcity time, people were ethically and legally forced to regulate their consumption. From an ethical point of view, there is an agreement between humankind that wasting food while others need it is unethical (Yoreh & Scharper, 2020).

More specifically, food is consumed every day at least three times. People's awareness controls their food consumption routine to be responsible or not. While the religious studies are mainly focused on rituals and customs, the food takes a significant proportion of such research stream (Grumett, 2013). Hence, religious events increase food waste similar to other social ones (i.e., weddings, births, and family gatherings such as Ramadan's banquets) (Abiad & Meho, 2018).

Moreover, as mentioned earlier in table 6-5, Muslims prepare excessive food for their hosted Ramadan banquets for five reasons. While impressing the neighbours and guests and overcoming loneliness are psychological needs,

showing the family's generosity and accommodating any uninvited guests are not solely religious. For instance, the Islamic religion encourages Muslims to welcome guests. However, Muslims exaggerate the meaning and extend it to prepare excessive food. Therefore, it is very important to measure the Muslims' perception about eating-related Islamic teachings to have a deep understanding of their food waste in the blessed month of Ramadan as in table 6-9.

Table 6-9, Food waste Islamic teachings (exploratory study)

Descriptive statistics				Test value = 3		
Items	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
The Holy Qur'an says, " <i>Children of Adam, Eat and drink, and do not waste. He does not love the wasteful</i> " (Qur'an 7, 31). I follow this rule to reduce food waste and obey God's orders.	295	6.32	1.325	30.059	294	.000
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>Mention Allah's Name (i.e., say Bismillah), eat with your right hand, and eat from what is in front of you</i> ". I follow this rule to reduce food waste by keeping the leftovers untouched.	286	6.29	1.525	25.365	285	.000
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>He also commanded us that we should wipe the dish saying: You do not know in what portion of your food the blessing lies.</i> ". I follow this rule to reduce the food waste by accurately estimate the food per dish.	293	5.89	1.573	20.575	292	.000
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>Whoever among you wakes up physically healthy, feeling safe and secure within himself, with food for the day, it is as if he acquired the whole world</i> ". I follow this rule to reduce food waste by buying only the needed food for the day.	294	5.43	1.825	13.421	293	.000
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>When any one of you drops a mouthful, he should remove anything filthy from it and then eat it and should not leave it for the Satan</i> ". I follow this rule to reduce food waste by eating the whole presented food.	295	5.44	1.890	13.089	294	.000

As can be clearly seen from table 6-9, the Muslim women significantly agree with all the five reported Islamic teachings of eating behaviour to reduce food waste at a confidence level of 99.9%. Although Muslims report their understanding of these religious and ethical teachings, they may not follow them in practice for two reasons. First, while Muslims who host the banquets show their understanding of these teachings, the guests may not. This means the food waste may be generated by the guests, not the hosts. Second, based on the Attitude-Behaviour gap (Sudbury-Riley & Kohlbacher, 2016), Muslims show their attitude to reduce food waste while eating; however, the same respondents report their wasting behaviour reasons, especially in Ramadan, as in table 5-14 in the exploratory study.

Among these reasons are the inability to store some food, Banquets, Unplanned purchasing, and lack of experience. This means that in the blessed month of Ramadan, while Muslims prefer to tighten their relationship with their god by obeying his teaching, they hold eating in a responsible and ethical way. This reflects the distinctiveness of banquets over religious teachings. More specifically, Muslims reveal their acceptance of all items related to the Islamic teaching of the guest's invitation and welcoming at a confidence level of 99.9%. as in table 6-10.

Table 6-10, Banquets related Islamic teaching (conclusive survey)

Descriptive statistics				Test value = 3		
Items	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
In Ramadan, we invite people for Islamic traditions (i.e., family connectedness) since the prophet (PBUH) said, " <i>He who believes in Allah and the Last Day, let him maintain good the ties of blood relationship</i> "	600	4.47	.944	38.114	599	.000
In Ramadan, we invite people to jointly break the fast since the prophet (PBUH) said, " <i>He who provides a fasting person something with which to break his fast, will earn the same reward as the one who was observing the fast, without diminishing in any way the reward of the latter.</i> "	600	4.47	.949	38.025	599	.000
In Ramadan, we invite people to our house to show our generosity since the prophet (PBUH) said, " <i>He who believes in Allah and the Last Day let him show hospitality to his guest</i> ".	600	4.39	1.005	33.852	599	.000

However, the same respondents report other psychological needs over generosity in 6.5. In this regard, from the Justification-Suppression Model (Veer & Shankar, 2011), Muslims may reason their preference (need for socialization) over the Islamic teaching perception. Consequently, a clear answer to their significant need for socialization in Ramadan's banquets supports this claim as in table 6-11.

Table 6-11, The need for socialization (conclusive survey)

Descriptive statistics				Test value = 3		
Item	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
Ramadan Banquets due to missing that feeling of socialization	600	3.96	1.308	18.037	599	.000

To this end, the use of Muslim perception of Islamic teachings only may be inaccurate as this perception can be changed/neglected over time and from one situation to another. In addition, the perception of Islamic teaching does not necessarily lead to good behaviour. Therefore, studying religious commitment is more accurate than the perception of Islamic teaching in studying food waste. Moreover, the perception of Islamic teachings has a significant positive effect on religious commitment, as in table 6-12.

Table 6-12, Islamic teaching and commitment (conclusive survey)

Path	β	t-value	Sig.	Confidence intervals	
				LCI 5%	UCI 95%
Perceived religious teachings -> Religious commitment	0.378	7.377	0.000	0.298	0.466

As can be seen from table 6-12, by following the same steps of the PLS-SEM, the Perceived religious teachings have a significant positive effect on the religious commitment by 37.8% at a confidence level of 99.9%. Therefore, the use of religious commitment as a proxy of the perceived religious teachings is supported.

6.3.2 Control variables:

Before testing the structural relationships in the theoretical model, it is worth explaining the steps of testing the control variables. The direct and indirect effects will be tested in the various groups (categories) of each demographic/socio-demographic factor to ensure controlling its effect. In this regard, the three steps of the Measurement Invariance of Composite Models (MICOM) were followed to perform the Partial Least Squares Multi-Group Analysis (PLS-MGA), namely, configurational invariance, compositional invariance, and equality of composites' means and variances with permutation procedure of 10000 subsamples (Henseler Jörg et al., 2016; Cheah et al., 2020).

It is worth mentioning that not all control variables' categories were balanced in terms of group size. If one group is more than the size of the other group at the same factor, it may affect the obtained results due to bias issues. Also, each group size should exceed the minimum required sample size to run PLS-SEM (Hair, Black et al., 2019). Therefore, eliminating too small groups, merging in-row categories, selecting a random sample from the big-size group, or splitting the big-size group at the following techniques to balance the groups' sizes in meaningful clusters.

At the individual level, the *Age* categories were not balanced in terms of the groups' sample sizes. Therefore, merging age levels was used to balance the groups' sizes. To this end, instead of the six groups of the age categories, three merged levels were incorporated in the analysis, namely, less than 30 years old (n=182, 30.3%) vs 30 to less than 40 (n=260, 43.3%) vs 40+ (n= 158, 26.4%). In addition, the *education levels* groups were not balanced since women with less than high school were 17 and those with high school were 53 only, while the Graduates and Postgraduates were 289 and 224 respondents, respectively. Therefore, the first two groups of the education level were eliminated, and the comparison was limited only to the graduates (n= 289, 48.2%) vs postgraduates (n= 224, 37.3%). Similarly, the comparison of the *marital status* focused only on married women (n=153, 25.5%) vs two random splits married with children's women groups (n=177, 29.5%) and (n= 211, 35.2%). All other marital status groups were eliminated due to insufficient sample sizes. Finally, the *job status* groups were merged to achieve a meaningful balance as follows: Not working,

including retired and housewives (n= 3.4, 50.7%) vs Working, including part and full time (n= 296, 49.4%).

At the whole household level, the *household size* groups were merged into three groups: less than 3 members (n=174, 29%), 4 members (n=188, 31.3%), and 5+ members (n=238, 40%). Similarly, the *socio-economic status* was split into two balanced groups on the 1 to 10-step ladder: less than 5 steps (n=248, 41.3%) vs 6 – 10 steps (n=352, 58.7%). *Household income* four categories were balanced, and *living areas* were only two categories. Hence, no change.

Moreover, at the *country or residency* level, the group of individualistic culture countries (n=132, 22%) were compared against two random-split groups of the collectivistic culture countries (n= 226, 37.7%) and (n= 242, 40.3%). Similarly, the emerged countries (n=151, 25.2%) were compared against the two random-split groups of the emerging economies (n= 236, 39.3%) and (n=213, 35.5%).

6.3.3 Religious commitment and food waste behaviour

6.3.3.1 Direct relationship

A two-tailed hypothesis was formulated to test the direct relationship between religious commitment and food waste behaviour as follows:

H1: Religious commitment has a significant direct effect on food waste behaviour.

The results of testing such a hypothesis showed that religiosity commitment has a significant negative effect on food waste behaviour by 13.3% at a confidence level of 99% as in table 5-36. Such result is confirmed across the Muslim women's age, work, education, and marital status categories. Similarly, the same result is confirmed across household size, income, and socio-economic status. Also, the negative relationship is confirmed across the living area, either urban or non-urban, individualistic vs. collectivistic culture, and emerged vs. emerging economies. Therefore, the effect of demographic and socio-demographic factors was controlled.

This means the higher the religious-committed Muslim, the lower the food waste behaviour is approached by 13.3%, and in turn, the lower the food waste

generated quantity across individual, household and country levels. This relationship is supported by the theory of Reasoned action (Ajzen & Fishbein, 1980). For instance, the Muslim woman's attitude (commitment) leads directly to her behaviour (food waste behaviour). In addition, since Muslim women revealed their high awareness of the Islamic teachings related to food eating and wasting behaviours, their negative effect is rationalized.

However, this leaves 87.3% for other factors to affect the food waste behaviour. The weak effect size of the direct effect of the religiosity effect holds the real experience of outweighing the religious commitment by other factors such as the need for socialization and showing the family generosity. In line with the social identity theory, Muslim women need to maintain or return his/her membership in the group even by ignoring the religious commitment for specific situations, such as Banquets.

Moreover, the current research extends the previous research that supports the positive effect of religious beliefs on environmental awareness (Abdelradi, 2018), pro-environmental behaviour (Rice, 2006), ethical consumption (Adil, 2021), and sustainable behaviour (Minton et al., 2015). However, the current research contradicts the previous research that reported the non-significant effect of the interpersonal religious commitment on eco-centric attitude and behaviour (Martin & Bateman, 2014).

In addition, the current research supports the benefit of studying food waste during the Islamic season of Ramadan instead of the whole year (Elmenofi A. et al., 2015; Abiad & Meho, 2018). Moreover, the current research adds new insights into changing the eating routines that can increase food waste (Aktas et al., 2018) by incorporating banquet behaviour during the blessed month of Ramadan. Finally, as the direct significant negative effect is weak, the indirect effect may exist to explain such a relationship.

6.3.3.2 Indirect-mediated relationship

The indirect mediated relationship between religious commitment and Food waste behaviour by materialism can be illustrated in three steps. First, the relationship between religious commitment and materialism. Second, the relationship between materialism and food waste behaviour. Third, the role of

materialism as a mediator in the religious commitment and food waste behaviour relationship.

First, the religious commitment's direct effect on materialistic values has been hypothesized as follows:

H2: Religious commitment has a significant negative direct effect on materialism.

The obtained result from testing this relationship revealed a negative significant effect of the religious commitment on food waste behaviour by 10.8% at a confidence level of 95% as in table 5-36. The current result is supported across the Muslim individual demographic categories of age, work, education, and marital status. In addition, at the household level, the same result is also replicated across the household size and income. Similarly, the living area, country of residence, and cultural factors do not reveal significantly different outcomes. Only the household socio-economic factor shows a significant effect.

To this end, the current research extends the well-established opposing of self-transcendence values (religiosity) against self-indulgent (materialism) values in the Schwartz Value Scale (SVS) (Schwartz & Huisman, 1995) in the Islamic religion. More specifically, as the Buddhist doctrine (Srikant, 2013), Hinduism (Essoo & Dibb, 2004), and Christianity (Veer & Shankar, 2011) discourage materialism values; the Islamic teaching “Shariah” is very rich in commands to reduce materialism and focus on good deeds to prepare for the day of judgement. Such negative relationship between any religion’s dimensions (i.e., Rituals, beliefs, Community, and Values) and materialism (Agarwala et al., 2019). This indeed reduces social inequality, envy, and crime and increases donation and charitable behaviour (Souiden et al., 2018). For instance, God says in the Holy Qur’an, “*That home of the Hereafter We assign to those who do not desire exaltedness upon the earth or corruption. And the [best] outcome is for the righteous. Whosoever brings good (Islamic Monotheism along with righteous deeds), he shall have the better thereof, and whosoever brings evil (polytheism along with evil deeds) then, those who do evil deeds will only be requited for what they used to do.*” (Qur’an 28, 83)

In addition, following the first-order measurement level of materialism, religious commitment has a significant negative effect on success by 19.8% at a confidence level of 99.9%. On the contrary, religious commitment has non-significant effects on centrality-acquisition (5.3%) and happiness (3.1%). This means that Muslims' commitment to Islamic teaching does not necessarily achieve their happiness, as it hinders them from focusing on the acquisition. Ultimately, this significantly reduces their feeling of success. This supports studying each value of materialism alone, as proposed in the literature (Pieters, 2013).

Moreover, while the low-moderate social class household (1-5 steps in the ladder) shows a significant negative effect from the religiosity commitment on materialistic values, the higher social class households (6-10 steps in the ladder) have an insignificant negative effect. This can be rationalized as the low-moderate social class households may not be exposed to the same high-priced brands as the high social class. Therefore, they may not face the same attraction to be materialistic as higher social classes. In addition, from the social identity theory lens, high social class households sometimes lack the time to be sociable since they have to work hard to maintain the same lifestyle level. Therefore, the higher social classes have a higher chance of being isolated from their in-group members. Therefore, to maintain or return their lost membership, they focus on acquiring materialistic products that give them success they need to be happy in their groups, even if this is against their religious commitment.

In addition, the Zakat is one pillar of the 5 pillars of Islam religion. Zakat means allocating 2.5% of all the wealth that the rich people have and giving it to needy people on an annual basis (Essoo & Dibb, 2004). Therefore. Some of the rich people may think as they pay the Zakat, they are free to be materialistic for the rest of their money. However, the same Islamic teachings, including the Zakat, encourage Muslims to control their needs to avoid unethical and unsustainable behaviours (Raggiotto et al., 2018; Adil, 2021). More specifically, unlike internal religiosity, the external dimension of religious commitment shows unclear effects on materialism (Veer & Shankar, 2011; Minton et al., 2016) due to the close connection between religiosity and materialism and status-seeking. This also can be based on the justification-suppression model, especially when Muslims donate their money to charitable organizations but, concurrently, they behave in a very

luxurious excessive manner (Veer & Shankar, 2011). To this end, the insignificant negative relationship can be reasoned by high priced brands, social isolation, and misunderstanding of Zakat.

Second, the materialistic values' direct effect on food waste behaviour has been hypothesized as follows:

H3: Materialism has a significant positive effect on food waste behaviour.

The extracted result from testing this relationship revealed a positive significant effect of materialism on food waste behaviour by 13.5% at a confidence level of 99% as in table 5-36. This result is supported across the job status, Education level, and Marital status categories. Similarly, it is supported at the household size, income, and socio-economic levels. Finally, it is replicated across emerging and emerging economies and individualistic and collectivistic cultures. Only Age and living area have significant effects on this relationship.

To explain this relationship, the theory of Reasoned Action can be recalled (Ajzen & Fishbein, 1980). While the attitude leads to the intentions, the latter is responsible for formulating the actual behaviour. Therefore, the more materialistic value the Muslims have, the more food waste behaviour engagement. Therefore, it is worth noting that Islamic teaching discourages people from being close to any unethical and unlawful behaviours since their closeness means a higher chance of acting accordingly. For instance, God says, “— *and that you do not draw near any acts of lewdness, grave sins, such as fornication, whether it be manifest or concealed, that is, [acts committed] overtly or in secret*” (Qur'an 6, 151)

Consequently, the current research supports the previous literature that states the danger of materialistic values on individual and societal levels (Stillman et al., 2012; Srikant, 2013). For instance, the current research extends the previous literature as materialistic values reduce ethical consumption, environmental life and activities (Arli et al., 2016; Sharif, 2016; Raggiotto et al., 2018). More specifically, the current research extends the unethical (Cui, P. et al., 2021) and unsustainable behaviour from Ozon depletion, global warming, pollution, resource shortage, and species extinction (Kilbourne & Pickett, 2008)

to the household food waste generation (Abdelradi, 2018; Diaz-Ruiz et al., 2018), among Muslim families in Ramadan.

In a more detailed view, acquisition-centrality and happiness have non-significant effects on food waste behaviour by 1.2% and 1.5%, respectively. Only the success materialistic dimension has a significant positive effect on the food waste behaviour by 16.3% at a confidence level of 99%. This means that Muslims who achieve success from their materialistic tendency increase their food waste behaviour. This arguably reflects the loop that Muslims may stuck in as they feel successful and then increase their unethical and corrupted behaviour, forgetting the Islamic teaching and God's observance. After that, God tests them, and they return to their God and follow his commands. This loop is clearly mentioned in the Holy Qur'an: *"And when We show favour to man, he turns aside and withdraws himself; and when evil touches him, he makes lengthy supplications"* (Qur'an 41, 51). Again, the current research supports the in-depth interpretation of the materialism dimensions (Pieters, 2013).

Apart from the above, the MICOM results showed significant differences across the age groups and living areas. For instance, middle-aged women (30 to less than 40 years old) have a non-significant positive effect of 4.9%, while older women have a significant positive effect of 30.5%. This means that the results can arguably be reasoned by the ability to reduce food waste behaviour among Muslim women. In this respect, middle-aged women can control their food waste behaviour even with their materialistic values. However, the older women's materialism leads them to waste food instead of reducing it. This means the elders are unable to control their food waste behaviour due to the high presence of their materialistic values. Since materialistic values grow with anyone from childhood and can be acquired by parents (Adib & El - Bassiouny, 2012), it is quite difficult after 40 years old to control it. Also, the health issues and accumulated experience hinder this cluster from controlling their food waste behaviour that is triggered by their materialistic personality.

Interestingly, the urban-living Muslims have a significant positive effect from materialism to food waste behaviour by 25.6%, while the non-urban-living Muslims have a negative significant effect for the same relationship by 28.5%.

This means Muslims in urban areas cannot control their materialistic values to reduce their food waste behaviour. Instead, they increase their undesired behaviour as their Material values increase. This is obviously due to the lifestyle of urban areas where the waste bins are collected from moderate and high social class households, with no responsibility. On the contrary, in non-urban areas, while mother nature exists, people appreciate the food and translate their materialism into food waste reduction. The increase in their materialistic values reduces their responsible and ethical behaviour towards the food they eat.

Third, the role of materialistic values in explaining the negative relationship between religious commitment and food waste behaviour has been hypothesized as follows:

H4: Materialism mediates the relationship between religious commitment and food waste behaviour.

The obtained result from testing this relationship revealed significant partial mediation by 1.5% at a confidence level of 99%, as in table 5-37. This means the more religious commitment, the less materialistic person, which in turn leads to less food waste behaviour. Such claimed relationship can be exited among Muslims, especially in the holy month of Ramadan. Therefore, the current study extends the prior literature that proved the partial mediation role between religiosity and ethical consumption (Adil, 2021), impulsive buying behaviour (Habib & Bekun, 2021), and Ecologically Conscious Consumption Behaviour (Raggiotto et al., 2018).

Moreover, the current research found that only success can mediate the relationship between religious commitment and food waste behaviour by 3.2%, while centrality-acquisition and happiness cannot. This enhances understanding of the loop that Muslims face when they feel more committed to the God; they feel pride and less materialistic and successful. Instead, they focus on good deeds to prepare for the hereafter. In addition, the positive relationship between success and food waste behaviour leads to less food waste behaviour when success is low. To this end, the higher Muslims' commitment to their religious teachings, the lower their feeling of materialistic success and, in turn, the lower their food waste behaviour.

6.4 Loneliness and food waste

Studying the relationship between loneliness and food waste begins with the COVID-19 pandemic and food waste behaviour. Then, there is a direct relationship between the two dimensions of loneliness and food waste behaviour. Finally, the role of materialism in mediating the direct relationship between emotional and social loneliness and food waste behaviour is explained.

6.4.1 COVID-19 and food waste

Due to COVID-19 and its related lockdowns and social isolation for two years, Muslims' feelings of isolation increased, besides their increased feeling of isolation during non-Ramadan days, especially when they are close to Ramadan and its expected banquets. This leads them to conduct the Banquets in order to mitigate such undesirable feelings. Fortunately, the Ramadan months of the same two years of 2020 and 2021 were in summer, when the measures of COVID-19 were partially reduced. This helped in increasing the banquet tradition in that blessed month. Table 6-13 shows the results of the COVID-19 pandemic on the Ramadan banquets.

Table 6-13, Ramadan banquets within COVID-19 time (conclusive study)

Descriptive statistics				Test value = 3		
Items*	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
Number of banquets	600	3.95	1.502	15.412	599	.000
Number of guests	600	3.86	1.521	13.766	599	.000
Food waste generation	600	3.56	1.455	9.400	599	.000

*All reversed items

Table 6-13 shows that the COVID-19 pandemic and its related Timed Intervening Policies (TIP) (Prentice et al., 2020) across the world have a positive effect on the banquets number ($\mu = 3.95 \pm 1.502$ out of 5) and the number of guests ($\mu = 3.86 \pm 1.521$ out of 5). This means people missed the gatherings and they felt lonely during the pandemic social distance measures as introduced earlier. This supports the collective experience of Ramadan, which has a positive effect on Muslims' moods (Białkowski et al., 2013). Hence, Muslims increase their connectedness with their relatives and friends by increasing the number of

banquets and their guests. This led to exaggerated cooked food for the banquets to show the generosity, which resulted in generated food waste. Hence, COVID-19 in the Islamic season increased the food waste rather than decreased it.

6.4.2 Loneliness feelings and food waste

In order to discuss the effect of loneliness on food waste behaviour, it is crucial to divide loneliness into its two dimensions: social and emotional (Weiss, 1973).

6.4.2.1 Direct relationship

The direct relationship between the loneliness feelings and food waste behaviour was hypothesized as follows:

H5: the feeling of a) emotional and b) social loneliness has a significant positive effect on food waste behaviour.

The results of testing the two sub-hypotheses showed that emotional loneliness has a significant positive effect on food waste behaviour by 11.6% at 99%, while social loneliness has a significant negative effect on food waste behaviour by 7.1% at a confidence level of 90% as in table 5-36.

Following the MICOM steps in PLS-MGA, the same result of the emotional loneliness and food waste behaviour was replicated across age, work status, education, and marital status categories in individual Muslim women level. From the Muslim household perspective, the same result was supported across the different household sizes, income levels, socio-economic status, and living areas. The country development levels (emerging vs emerging economies) did not have significant effects on the same result.

Moreover, the relationship between social loneliness and food waste behaviour was supported in the individual level of analysis across the age, work, education, and marital status groups. In addition, the significant negative effect held in different household sizes, socio-economic status, and living areas. Finally, the country of residency culture and development did not affect this relationship. To this end, it can be clearly seen the importance of studying the dimensions of loneliness separately as each dimension has a different effect on food waste

behaviour. Accordingly, the current research extends the prior literature by studying the loneliness dimensions (Masi et al., 2011) in the Islamic context.

More specifically, the emotional loneliness's positive effect on food waste behaviour in Ramadan's banquets can be grounded in Relational and social identity theories. In this regard, emotional loneliness is experienced when Muslims lose intimate connectedness with others, such as loved ones, family members, or friends (Loh et al., 2021). Such status had clearly occurred to Muslims in 11 months of the year. The severity of such emotional feelings was increased in the COVID-19 and its related measures. In fact, one of these measures was well-known as *social distance*. Such two words can be sufficient to formulate the loneliness feeling.

Moreover, from the relational theory lens, Muslims build their relationships with the same three kinds that they may feel emotionally isolated, namely, loved ones, family members, and friends. Moreover, from the social identity theoretical background, Muslims used to exchange banquets with the in-group members during Ramadan as they shared interests, conversations, and attitudes. In addition, emotional loneliness leads to feeling isolated from the in-group. Hence, Muslims with emotional loneliness try to maintain their risky membership or return their imagined lost membership from the in-group by approaching some compensation behaviours, such as hosting banquets in Ramadan.

A higher-risky or imagined lost membership leads to exaggerated prepared food for the banquets just to maintain the social identity. In addition, The more feelings of emotional loneliness, the higher feelings of self-discrepancy (Loh et al., 2021) between the actual and ideal selves (Higgins, 1987). Such discrepancy feeling intensifies the emotional loneliness feeling and keeps the Muslim within the loneliness loop (Klein, 2020; Han et al., 2021; Müller et al., 2021). Moreover, some strategies have been introduced to reduce emotional loneliness, such as group treatment (Marmarosh et al., 2020), women's self-compassion treatment (Farzanfar et al., 2020), and eating (Kim, Youn - Kyung et al., 2005; Pettigrew, 2007) aim to a) improving social skills, b) enhancing social support, c) increasing opportunities for social contact, and d) addressing

maladaptive social cognition (Masi et al., 2011), can be all achieved by hosting the Ramadan banquets to avoid the fears of negatively evaluated by others.

Moreover, eating behaviour as compensation to reduce emotional loneliness can be problematic in two ways. First, the Muslim woman who needs to eat cannot do it due to fasting. Even her feeling is maximized due to changing her eating routine. Second, banquet guests and Muslim women who host such banquets cannot eat as much as they can due to social desirability concerns and showing the host family generosity. Ultimately, the extra-prepared food is wasted in these banquets due to the feeling of emotional loneliness.

As a result, the effect size of emotional loneliness on food waste behaviour varies across cultures surrounding the Muslim household. For instance, in a collectivistic culture, emotional loneliness has a significant positive effect on food waste behaviour by 13.6%, while in an individualistic culture, the same relationship is negative by 16.5%. This obviously can be rationalized from the social identity theoretical perspectives. As Muslims generally live in collectivistic cultures, their emotional loneliness feeling, which threatens their in-group membership, can be easily compensated by hosting banquets with excessive amounts of food to maintain their social identity. However, in individualistic cultures, people do not have to accept every banquet invitation in Ramadan. Accordingly, the banquet solution is not always acceptable, which increases the fear of rejection. Therefore, emotional loneliness can reduce the food waste behaviour of Ramadan banquets in individualistic cultures. Finally, the current research extends the prior research that focused only on emotional loneliness to build the brand relationship with customers (Loh et al., 2021).

Apart from this, social loneliness has proven to have a significant negative effect on food waste behaviour. Social loneliness develops from the lack of a larger social network that provides a sense of belonging due to death or divorce (Rippé et al., 2018; Loh et al., 2021). In this regard, within the COVID-19 pandemic, Muslims in Ramadan lacked the increase of their social network with working-at-home, stay-at-home, distance learning, job insecurity, and lockdown measures (Roggeveen & Sethuraman, 2020). Such measures transformed the worker women to have reduced their external world and focus on the limited

nonfamily internal world only (Kim, Youn-Kyung et al., 2005). In addition, a Muslim housewife suffers from her multi-faced roles in the house as wife, mother, and housekeeper (Loh et al., 2021) more than the non-pandemic times, as there is no way to take a break from her house. Hence, more stress leads to more social loneliness. Therefore, their social loneliness increased (Werner et al., 2021) within the pandemic among Muslim women, as it has been proven among old people's previous literature (Bertram et al., 2021; Sams et al., 2021).

Moreover, Ramadan banquets could not help in mitigating such feelings, as Muslim guests or hosts cannot risk their lives by hosting such banquets. In fact, their social loneliness leads to intensifying their self-discrepancy feeling between the actual, and ideal and ought selves (Higgins, 1987; Kupersmidt et al., 1999). In addition, the failure to perform the Islamic teaching by re-establishing connectedness, engaging with blood relations, generously welcoming others, and tightening relatives relationships increased self-discrepancy feeling, instead of social solidarity (Shalihin et al., 2020).

Hence, such social isolation hindered Muslims from inviting in-group members, besides the risk of getting the virus. Also, the other corrective regulatory strategies, such as shopping (Ong et al., 2015) was prohibited. Hence, Muslim women were stuck in their homes with reading, gardening, or even cooking alone or with the very close family (Ong et al., 2015) Troisi & Gabriel, 2011). Therefore, the social loneliness reduced the banquets which, in turn, reduced the food waste behaviour.

Such a relationship is founded differently according to the household income levels. For instance, in households with low income (\$500 monthly income or less), social isolation had a non-significant positive effect on food waste behaviour by 6.2%. While in high-income households (\$1500 monthly income or more), the same relationship was significantly negative by 30.4%. This can be explained in two dimensions. First, the perceived risk of getting COVID-19 from socialization in high-income families is obviously higher than in low-income families. Second, high-income families are more responsible than low-income ones in terms of breaching COVID-19 measures consequences. For instance, high-income families understand how far the governments struggle to control the

virus spread without vaccines as they often work at top managerial levels, to earn such income monthly. This, in fact, reflects their perception of the consequences they will have if they breach the measures (i.e., Matt Hancock's resignation as the UK health minister due to the same reason in 2021). Therefore, the higher social loneliness in high-income families resulted in lower Ramadan banquets and less food waste behaviour.

6.4.2.2 Indirect relationships

The indirect effect of loneliness on food waste behaviour is divided into two sections. First, the direct effect of the loneliness feeling dimensions on materialism. Second, the mediation role of materialism on the relationship between loneliness and food waste behaviour. It is worth noting that the direct effect of materialism on food waste behaviour has been discussed earlier in this chapter under the religiosity effect. Since there will not be any changes in this path, it will not be discussed here.

Accordingly, the relationship between loneliness feeling and food waste behaviour has been hypothesized as follows:

H6: The feeling of a) emotional and b) social loneliness has a significant positive effect on materialism.

The PLS-SEM outputs referred to a significant positive effect of emotional loneliness on materialism by 34% at a confidence level of 99.9%. In addition, social loneliness has a significant negative effect on materialism by 14.9% at a confidence level of 95%, as in table 5-36. Such relationships have been confirmed across all the Muslim women's demographic variables, such as work, education level, and marital status. Similarly, across all the household units of analysis level, the same results have been confirmed across the income, socio-economic, and living areas in both collectivistic and individualistic cultures and emerged and emerging economies. Although the same results of social loneliness were confirmed across the Muslim women's age and household size, emotional loneliness was not. To this end, the current research extends the prior literature of studying the loneliness effect on materialism (Santini et al., 2017) in Eastern (Loh et al., 2021) and Western countries (Pieters, 2013), during the COVID-19 times (Moldes et al., 2022).

For instance, based on the social identity theory, emotional loneliness stems from a lack of intimate relations with another in-group member. Following this, Muslim women tend to compensate for their membership at risk of loss by acquiring more material products just to feel successful and happy when they restore their membership. This is supported by the significant positive effect of emotional loneliness on centrality acquisition by 25.9%, success by 25.4%, and happiness by 33.8%.

Consequently, during Ramadan, Muslim women who feel emotional loneliness and fear of losing their membership in the extended family and friends host some banquets to maintain or restore their social identity. Their social identity maintenance or restoration in the banquet forms focuses on acquiring more people and cooking more prepared food to prove their social identity. This is apart from religiosity since Muslim women presented their tendency to show their neighbours and guests their generosity above the Islamic teaching. Accordingly, during or directly after the banquet with wasted excessive food, Muslims feel successful in eliminating their membership risks, and then they feel successful. In this regard, the current study supports studying the effect on the materialism dimensions (Pieters, 2013).

In addition, the emotional effect on food waste behaviour differs from middle to aged women and from small to large household sizes. First, while middle-aged (30-40 years old) women's emotional loneliness has a significant positive effect on materialism by 19.9%, the aged women (40+ years old) have more than the double effect (40.5%). This means that older women who feel emotional loneliness are unable to control their materialistic personalities and willing to keep their social identity more than double that of middle-aged women. This is in line with the previous research that showed that older people are susceptible to feeling more loneliness than younger ones (Kim, Youn - Kyung et al., 2005; Pettigrew, 2007). In addition, from an Islamic point of view, the old people host the bigger banquets as they should have more offspring than young families. This obviously helps them to mitigate their feeling of loneliness and signify their social identities among the extended family.

Similarly, Muslim women in a small household size (2-3 members) with high emotional loneliness feelings have high materialistic values of 18.2%, while those in a large household size (5+ members) have more than double effect (42.3%). This is generally grounded in the theory of social identity, too. Emotional loneliness within a big household size deepens the feeling of isolation and the fear of being out of the bigger group. Hence, the more concerns about losing the membership, the more materialistic values appear to maintain such social identity. Therefore, the women with emotional loneliness in the small sample size have less tendency to follow their materialistic personalities to compensate for their feelings.

Moreover, the social loneliness that stems from the reduced network of the in-group world has a negative effect on the materialistic values by 14.9%. This means that the more the Muslim woman felt socially isolated, the less they followed their materialistic values to compensate for such undesirable feelings. Such a result is confirmed across all the women and their household socio-demographic factors. In this regard, Muslim women understood that their social isolation cannot be mitigated by unleashing their materialistic persona. Instead, due to the COVID-19 pandemic and its related consequences, Women preferred not to attract new members to their established groups by impressing them with health-risky materialistic products. Instead, they might think about closing their in-group until the pandemic ends and shift to virtual social groups on social media platforms (Grau et al., 2019), or attracting new members through non-materialistic products such as virtual social groups do not necessarily require the actual existence of the material products.

To this end, the indirect effect of loneliness feelings on food waste behaviour has been hypothesized as follows:

H7: Materialism mediates the relationship between the feeling of a) emotional, b) social loneliness and food waste behaviour.

With this respect, Muslim women have a significant indirect positive effect from emotional loneliness on food waste behaviour via the materialistic values by 4.6% as in Table 5-35. Such a commentary partial mediation role of materialism explains the negative state of feeling emotional loneliness that may risk or lose a

Muslim woman and her household membership. Therefore, she follows her materialistic values when inviting other members of the social group and prepares excessive materialistic foods to impress them. This, in fact, is explained by only the success of materialistic value as the main aim of following materialism is to feel success in keeping or restoring the social identity through the Ramadan banquets.

On the contrary, Muslim women have significant complementary partial mediation on the relationship between social loneliness and food waste behaviour by 2% as in table 5-37. This means that Muslim women reduce their materialistic values, which are driven by their social loneliness, in order to save their social identity. Concurrently, she saves herself and the entire household from the health risks of getting COVID-19 by inviting others to her house for Ramadan banquets.

To this end, it can be concluded that social identity-related factors, emotional loneliness, social loneliness, and materialism, collectively, mask ethical/moral behaviour such as religious commitment to avoid responsible consumption of food. Therefore, *Obj4*: Measure the effect of social and psychological factors on food waste behaviour among Muslim families during the seasonal time of Ramadan has been achieved. This means Muslim households during Ramadan experience high religious commitment, which reminds them about food consumption and its related-religious teachings. This leads them to intend to reduce their food waste. However, due to the fears of being negatively evaluated by others, which may result in threatening their social identity (in-group membership), their surrender to their materialistic values, which results in increasing food waste, and ignoring their religious commitment.

6.5 Research limitations and future research avenues

The research limitations and future research are related to the methodological shortcomings and their possible remedies in the future.

6.5.1 Text analytics

To begin, applying the social listening practices from a *passive researcher (observer)* perspective, who did not interact with the tweets, enhanced the credibility of the qualitative analysis and also removed any biases and social disability issues (Malhotra & Dash, 2016), especially with ethical and sensitive topics (e.g., food waste behaviour). However, it limits the study to the respondent's perspective only. In this regard, an *active researcher (participant)* who participates in the interactions of the tweets may reveal new insights to the research from dynamic (or static) discussion/thread following the netnography or digital ethnography research methodology (Merriam & Tisdell, 2016).

In addition, instead of applying the *qualitative* analysis techniques, a more rigour *quantitative* statistical analysis (i.e., Structural Equation Modelling) can be applied to measure the engagement and interaction (e.g., replies and group discussions or blogs) with phenomena, especially when studying a specific handle/username timeline (Shaw, 2021). Moreover, such quantitative analysis may help in studying the boycotting behaviour (Al-Hyari Khalil et al., 2012) that has been intensively studied in unethical issues.

In addition, one of the main challenges to generalize the X data analysis results is the *exclusion* of those who do not have access to X. However, complementing the X data analysis with another data collection method (i.e., survey) reduces such biases. However, the current *complementary study* was applied online which excluded people without internet access. This is indeed due to the COVID-19 outbreak and its related measures. Therefore, future researchers should combine online and offline X users with non-X user's data when collecting X data.

Similarly, although the current research applied the social listening research over 43 days (21-6-2020 to 3-8-2020), it is still *cross-sectional* data.

Hence, long-term *longitudinal research* may help study household food waste behaviour and cultural changes over time (Heinonen and Medberg, 2018).

Moreover, the current research focused *only on X platform* to retrieve the opinions from social media. Therefore, including *other social media platforms* such as YouTube, Instagram, Pinterest, Snapchat, WhatsApp, and Facebook Messenger (Heinonen and Medberg, 2018) may add new insights into the food waste phenomenon.

More specifically, the tweets were retrieved in only the *English language* to standardize the understanding of the food waste phenomenon. Future research may include various languages to cover the other *non-English speakers'* perceptions. Moreover, the inclusion of the Arabic language is necessary for future research since the Islamic doctrine was originally founded. Moreover, the French language is also important to be included in future research since most of the Islamic countries were occupied by France, and their main language currently is French.

In addition, using the free API v. 1.1 with *limited features of incomplete* tweets and randomly selected 18000 or 1% of all daily tweets enhances the current study generalization. However, the use of *API v.2 basic* to census the X is more robust for future research.

Further, although the current retrieved tweets are publicly written for non-research purposes, the cleaning process helped in preparing researcher-generated documents (Merriam & Tisdell, 2016) from these tweets. This cleaning process reduced the total number of tweets from 42552 to 14388 genuine, valid and complete tweets, with a *0.338 validity rate*. Therefore, to mitigate the irrelevant tweets (documents) effect on the sample size, future researchers should consider collecting *three times the sample size* they target.

In addition, since the current research tweets were retrieved *without their related attachments*, studying the *attached text, audio, and visual materials* (Heinonen and Medberg, 2018) to each tweet may help in understanding the sentiment of each tweet instead of studying the text alone.

Finally, from an ethical point of view, the parts of each used tweet in the current research were *removed* to hinder the accessibility to the authors. Future research should consider the *stemmed text* or rearrange the sentences of the tweet instead of the genuine text before cleaning and hiding parts of the tweet. However, future research should also consider changing the meaning to the genuine tweet when cleaned and stemmed tweets are quoted.

6.5.2 Surveys

The *cross-sectional* studies focused on a specific period within the COVID-19 pandemic. Hence, a *longitudinal study* with the application of the same survey in post-COVID-19 times may enhance understanding of the role of loneliness and social needs.

In addition, the exploratory research has been implemented with a survey using a *semi-structured questionnaire*. Therefore, future research may incorporate *personal interviews or focus groups* to reflect the emotions and interactions of the participants that provide rich insights into the context (Merriam & Tisdell, 2016).

Further, people in their homes reported their food waste increased. This means the traditional focus of the *individual* food waste behaviour can be extended to the whole surrounding group (i.e., near family). Therefore, as the current study focused on family consumption as part of *the Group Consumption Behaviour (GCB)* in order to promote the sharing economy, further research can study family dynamics and interactions and how they affect food waste behaviour to mitigate such undesired behaviour from its origin.

In addition, the *non-random convenience* sampling technique was applied in the exploratory and conclusive survey. This is due to the inability to reach the sample frame to provide equal opportunities to all sampling units. Hence, the current research results can be generalized with caution. Therefore, future researchers may include *systematic sampling techniques* to ensure a higher representation degree of the population.

Moreover, the exploratory studies of the X and the survey were implemented *in parallel*. Hence, the *sequential application of X, then surveys* or vice versa could enhance the exploratory process of the phenomena.

Regarding the variables' measurement and scales, the current research applied *religiosity as one construct* instead of two separate internal and external dimensions. In addition, the Confirmatory Factor Analysis supports the use of the one-first order over the higher-order construct of all measurement items. In addition, to measure food waste behaviour, two other measures were used in the literature of food waste behaviour. For instance, the plate leftover quantity (Lorenz et al., 2017) and items quantity of various food waste (Stefan et al., 2013; Romani et al., 2018; Aka & Buyukdag, 2021) were used to measure food waste behaviour. However, they are more related to the food waste volume instead of the consumer behaviour. Hence, future research may use *different measurements* than the incorporated one in the current research to reach more insights.

Additionally, surveys were used to *explore* Muslim household behaviour toward the generated food waste from Ramadan banquets and to *uncover* the social identity and religious commitment conflict for the first time. However, experimental factorial designs could enhance the methodological rigour in testing this *cause-effect relationship* in the future. For instance, an experimental between-subjects study (Field & Hole, 2002) can be more robust in comparing the effect of each of the religious commitment and loneliness feelings on the food waste behaviour instead of the current cross-sectional design. In addition, while the current study focused on seasonal food waste among Muslims, such as Ramadan Banquets, a comparison with non-Ramadan banquets can extend the current contribution by polarizing the role of banquets' time.

Finally, the current study applied the Multi Group Analysis for 10 socio-demographic variables to test the theoretically well-established and *expected heterogeneity* effects. Future research can extend the current work by uncovering the *hidden heterogeneous* groups in the sample using the finite mixture (FIMIX) (Hair et al., 2016; Matthews et al., 2016) and then create the clusters using cluster

analysis from the included sociodemographic variables to be incorporated in the Multigroup Analysis.

6.6 Chapter summary

This chapter was dedicated to presenting the key findings and their interpretation. It started with the results from the exploratory research aimed at understanding food waste behaviour during Ramadan among Muslim families. Subsequently, both direct and indirect relationships identified in the study were discussed in detail. Finally, the research limitations and avenues for future research are discussed. The next chapter will discuss the implications of these findings.

Chapter 7 Conclusion

Experience without theory is blind, but theory without experience is mere intellectual play.

Immanuel Kant

7.1 Introduction

In a nutshell, this chapter aims to conclude the whole thesis. More specifically, it begins with the summary of results. Then, the current research implications are introduced for various stakeholders. Figure 7–1 shows the current chapter map.

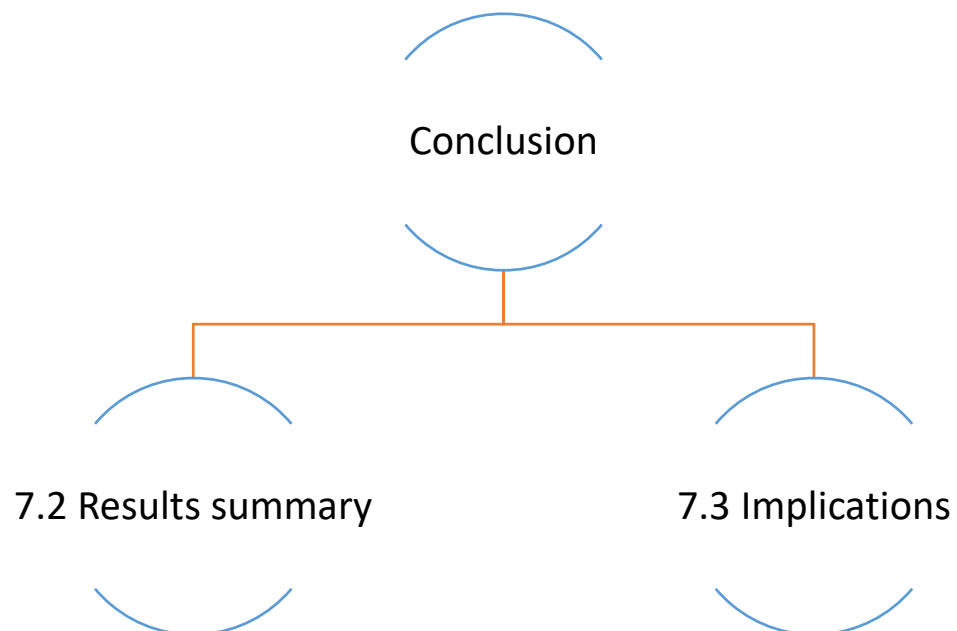


Figure 7–1, Conclusion chapter map

7.2 Results summary & research contributions

In the current research, the three empirical studies revealed reasonable results that can be summarized into four main pillars. Each pillar reflects a research objective achievement. Accordingly, the first study helped explore the general awareness of food waste behaviour among households (*Obj1*) around the world. In this regard, the text analytics of the “English-written” tweets worldwide highlighted the food waste behaviour as a negative, unethical and disgusting action that can be taken either individually or by the whole family. Moreover, people encourage fighting such awful behaviour. With regards to the value of this behaviour, the monetary value is clearly highlighted to present the food waste. In addition, the “Zero food waste” campaign has largely appeared to formulate the current awareness issue.

In addition, to understand the role of COVID-19 effect on food waste generation (*Obj2*). The three studies helped in achieving such an objective. First, the X data analytics suggested the inclusion of feeling loneliness in studying such behaviour due to COVID-19-related measures. Moreover, in the lockdown, people shift their eating behaviour from fast food to home-made food. Therefore, cooking the food was used as one of the time-passing strategies in lockdown. Second, the exploratory study revealed that almost 1% of Muslim families followed food-sharing tactics to reduce food waste during Ramadan. Therefore, they need practical tips from the businesses to share their food with high-hygienic applications. Moreover, Muslim women agreed on their awareness about the dangerous environmental consequences related to food waste behaviour. This is seemingly due to the COVID-19 origin from the food market in Wuhan and its related health and hygiene concerns. Finally, the third study confirmed the effect of COVID-19 on food waste behaviour among Muslim households. Since the feeling of social isolation increased, the number of social gatherings, “banquets”, increased to compensate for such feelings. In addition, the number of guests at each banquet is increased as well. Hence, the exaggerated prepared food for such banquets is increased, which is positively reflected in the food waste generation.

Furthermore, the second study was applied to deepen the understanding of unique characteristics of food waste behaviour among Muslim families in Ramadan (*Obj3*). In this regard, Muslims conduct 2-5 in-home banquets in the Blessed month of Ramadan, which distinct it as a season of gathering eating behaviour. In addition, the unplanned and uninvited guests and showing the family generosity are the main two reasons to prepare extra food for such banquets. Moreover, the Muslim majority did not know of any food waste campaign. Therefore, they were convinced that they lacked the ability to value the food waste per meal. However, they understand the Islamic teachings related to food eating and wasting behaviour.

Moreover, the Muslim food waste generation is not significantly different across the two meals and in the early and late days of Ramadan. In addition, the main reasons behind wasting food during Ramadan are the inability to store leftovers, banquets, unplanned purchases, lack of experience, exaggerated feelings of hunger, and food banks. Therefore, it is necessary for Muslims to keep the leftovers in the fridge before the expiry date. Also, as they understand the various consequences of the food waste, they claimed their edible/non-edible separation strategy to reduce the food waste. In addition, sharing the leftovers with others was not allowed for health-related factors. Similarly, for social desirability reasons, banquet hosts are unable to give the guests their banquet's leftovers. Finally, from an ethical and religious point of view, Muslims reject gaining the discount benefits as it increases food waste due to packing or expiry date aspects.

Last of all, the conclusive study was implemented to assist in measuring the main psychological and social factors roles in food waste generation among Muslims in Ramadan (*Obj4*). For instance, religious commitment had a significant negative effect on materialism and food waste behaviour. Also, materialism significantly increased food waste behaviour. This means that materialism can be claimed as a possible mediator between religious commitment and food waste behaviour. Moreover, social loneliness had a negative effect on food waste behaviour and materialism, which suggests materialism is a mediator in social loneliness and food waste behaviour. On the contrary, emotional loneliness had a positive effect on food waste behaviour and materialism. Therefore, materialism

can mediate the relationship between emotional loneliness and food waste behaviour. Eventually, all the current relationships were widely validated across individual and family socio-demographic categories.

7.3 Research implications and recommendations

Theoretical, managerial, policymaker, societal, and ethical implications and their subsequent recommendations to be sustained by specific actions are discussed in this section.

7.3.1 Theoretical implications

7.3.1.1 Food waste value:

With regards to the value of the food waste, the monetary value was clarified in X. This implies that the monetary value should be selected over the nutrition, social, and environmental values of the food waste in further research. However, the exploratory survey reported that one-third of the sample could not give specific value to their wasted food. The other two-thirds mentioned the food waste value as food types or *nutrition*, while only 5% only mentioned the *monetary value*. This means the food waste value among Muslim households is either confusing or each community has a different valuation method for food waste. For instance, the World Food Index Report (2024) reported various valuation methods that vary from one region to another. Among them, direct measurement devices (scale), waste composition analysis (source separation into edible and non-edible), volumetric assessment (the space allocated for the food waste), counting and scanning (food waste bags or items), and households' diaries (number of collecting the trash per day to throw it in the bin and reasons of it). Therefore, the current research highlights the importance of food waste valuation among Muslim communities as they almost depend on the waste composition analysis, which is based on *source separation* into edible and non-edible.

7.3.1.2 Social identity vs responsible consumption

First, the results of both negative and positive tweets revealed similar semantic analysis results. However, splitting the positive tweets from negative tweets supports the conflict in online communities. Such conflict is highlighted among Muslim households when studying social identity-related factors against religious commitment.

A conclusive survey reveals the significant effect of religious commitment and loneliness feelings on food waste behaviour. However, these relationships were focused on the independent effect of each exogenous variable. This confirms the social identity variables (loneliness and materialism) effect outweighs the religious commitment to food waste behaviour. This is clearly justified by the attitude-behaviour gap (Sudbury-Riley & Kohlbacher, 2016), especially in ethical situations such as responsible consumption of food. Such a justification can be explained by the need to support the in-group membership. However, the social group, in this case, is not a religious group (as it is supposed to be in Ramadan). Instead, it is a social group of extended family and friends. Hence, the social identity factors dominate the religious commitment.

Furthermore, the partial mediation roles of materialism in the relationship between religious commitment and loneliness, on food waste behaviour can be extended by incorporating more psychological and social variables to explain such relationships, such as environmental awareness, and personal norms (Abdelradi, 2018; Elhoushy & Jang, 2020). In addition, a conditional moderated mediation analysis (Hayes, 2013; Sarstedt et al., 2020) between the interaction of religious commitment and loneliness on food waste behaviour could help in understanding the role of social identity in irresponsible consumption behaviour. Moreover, parallel mediation and sequential mediation between these multiple mediators may reveal more insights about food waste behaviour.

Moreover, the significant negative effect of religious commitment on food waste behaviour is supported across various sociodemographic factors in a cross-culture and cross-country study. This means religious teachings and awareness about food waste reduction are perceived. However, the effect is questionable when the Muslim household suffers from loneliness feeling. At the same time, materialism is proven to mediate such a relationship. However, the mediation role is partial, and there are other religious and ethical related mediators that can be incorporated to support this relation against materialistic values. More specifically, the complementary mediation effect of materialism is confirmed due to the negative relationship between religiosity and materialism and the positive relationship between materialism and food waste. This indirect negative relationship complements the direct negative. However, in a negative

direct relationship, a competitive mediator may help in reducing the outcome increase along with the independent variable, rather than a complementary one.

In addition, it is vital to distinguish the effect of emotional loneliness from social loneliness from a social identity lens. In the current research, emotional loneliness has a significant positive effect on food waste behaviour. However, social loneliness is the opposite. It is crucial to study each dimension alone as the social isolation that happened due to COVID-19 had different effects on each dimension. For instance, the level of loneliness differs from emotional to social tendency persons. Therefore, incorporating the loneliness history, personality attributes, material parents (Adib & El-Bassiouny, 2012), and norms may help in understanding the abovementioned conflict.

In addition, the current research results show that Muslim household's emotional loneliness has opposite effects on food waste behaviour across individualistic vs collectivistic cultures. Therefore, studying loneliness dimensions across various cultures in the current research is broadening the social identity theory.

Finally, it is also worth noting that social loneliness has a negative effect on food waste behaviour. This is due to the study focus of food waste in the current study has been generated from the banquets. As socially lonely people feel isolated in terms of people's absence, they cannot compensate for their feelings by inviting them to a banquet. Hence, different research settings may help more in understanding the role of social loneliness in reducing food waste behaviour.

7.3.2 Business implications

It is worth mentioning that the parties that have direct contact with food waste are the retailing and hospitality sectors. Retailers (either supermarkets or open markets) are the main providers of household food in Muslim communities, as reported in Table 5-17. Therefore, the current implications are provided to the retailing sector.

7.3.2.1 Food waste value

As the food waste value was not clearly identified (e.g., monetary vs nutrition) value, businesses should not only use the monetary value in presenting the food waste in their policies and posts. However, the focus on the value of edible nutritious food can be effective, especially in Muslim communities, especially during the holy month of Ramadan. In addition, offering a lot of discounts over food waste will be recognised as unethical behaviour. Moreover, from a long-term financial perspective, the discounts that deceive the customer into buying large chunks of food will reduce the food waste in the store. However, at the same time, it shifts the responsibility from the retailers to the customers. Ultimately, it creates a negative image of the store that follows such unethical practices in the long term. This inevitably results in reducing the business's financial performance in the end (i.e., boycotting). For instance, the “Rising Food Costs Support Food Waste Reduction” campaign in Australia, Canada, the UK, and the US has led 95% to take action to save money on food bills. At the same time, retailers can help reduce food waste by non-financial means such as “Reducing Food Waste by Promoting Ugly Fruit”, which significantly links the purchase of ugly food to the generated food waste (Waste Reduction - Tools of Change, 2024).

Moreover, an updated prediction method could help in updating the store's needs to reduce food waste. In addition, to enhance financial performance, businesses adopt and invest in corporate social responsibility activities. Among such activities is fighting food waste. It is vital for retailers and all supply chain tiers to partner with and fund the NGOs' campaigns to reduce food waste, as has been investigated by restaurants (Shu & Hu, 2022). In a related vein, retailers can proactively regulate the whole value chain, rather than being reactive to the supply chain power conflict. Such a value chain should focus on ethical and sustainable consumption behaviour to the limited natural resources of the planet.

While Muslim women wanted more practical tactics to reduce their generated food waste, they actually mentioned three main strategies to mitigate the food waste. They keep the leftovers in the fridge, and then they reuse them. However, their donation behaviour is mainly to poor people. Therefore, it is vital for businesses in each community to partner in a more robust agreement with the

food banks to deliver the leftover fresh and untouched to needy people while maintaining their dignity instead of knocking on the door behaviour. For example, the “Messaging Tips for Promoting Green Behaviors” intervention has been investigated to be an effective intervention in reducing food waste behaviour among households (Waste Reduction - Tools of Change, 2024). In this regard, with Muslim households, retailers can benefit from this intervention related to the religious teachings that Muslims declare their understanding and awareness of.

Next, as women mentioned, their preferred way to mitigate the leftover food waste is to put it in the fridge and then reuse it; they also mentioned that this solution is, in fact, a threat as some food items should be consumed at once. Hence, it is the business's responsibility to provide some innovative solutions to keep such “once opened, should be all consumed” items in the fridge and reuse them. In particular, women mentioned they need hygienic food-sharing regulations, recipes to cook the leftovers, and food bank protocols with families to reduce their food waste behaviour.

Religious-committed women mentioned their negative feelings towards food waste behaviour. Businesses can use religious teachings in their campaigns to raise awareness about the importance of religious commitment importance. In addition, as business induces materialistic values in stimulating the unplanned purchasing behaviour of the customers, there is a need to abandon such techniques in their ads and campaigns as it has a positive effect on food waste generation. For instance, Fork It Over! is a peer-to-peer application in Portland that encourages the sharing economy (Waste Reduction - Tools of Change, 2024). Retailers in Muslim communities can easily regulate such applications as they have the facilities to check untouched food, repack it, display it in large fridges beside their offered ready meals, and redistribute it on the same day while maintaining consumer dignity. Needy people can easily get vouchers and discounts to buy their food from the supermarket. Similarly, vouchers can be customized to target these donated meals.

7.3.3 Policy implications

The research results reported that a significant proportion of the sample does not know of any food waste-related campaigns. Therefore, trade unions, health and safety authorities, and NGOs should organize regular campaigns that enhance awareness about how food waste is a disgusting behaviour. Also, it wastes much money with reasonable and accurate numbers that can be allocated to needy people. Finally, such campaigns should teach and train individuals how to reduce their food waste. Moreover, trade unions and health and safety authorities in each country should have the power to formulate laws and regulations that ensure the reduction of food waste across the whole supply chain tiers. A good example of such a campaign that is clearly mentioned in X is “Zero Waste” in Scotland, UK. Also, “Love Food Hate Waste” is another useful campaign that can be used as a first step in building a meaningful and helpful campaign to reduce food waste.

Additionally, Muslims claimed their awareness of the Islamic teachings related to eating and food waste. However, when they put it into practice, not all of them follow these teachings. This is in line with the attitude-behaviour gap. Therefore, the campaigns should carefully select Islamic teachings to mitigate food waste and raise the awareness of Muslims. Initiatives like “Rising Food Costs Support Food Waste Reduction”, “Recycle-Bowl: Competition Fosters School Recycling”, and “Food Waste: From Measurement to Management” (Waste Reduction - Tools of Change, 2024), were confirmed on a macro community level.

In addition, the tactics of mitigating the leftovers included donations to needy people as the third tool. This, in fact, reflects the absence of the food banks. From the food banks' point of view, they need many funds to provide accessible branches to collect the untouched leftovers from the restaurants and hotels. However, food banks lack such funds and need more facilities from the governments to extend the untouched food collection points and redistribution network to the needy people instead of knocking on the doors. Moreover, knocking on the doors of rich people is very humiliating to the poor people if they have access. It is also unsafe for rich people to open their doors to every poor person. Similarly, rich people will not be obliged to donate their leftovers each time they knock on the doors of poor people or homeless. Hence, the leftover is

wasted. A critical solution with a mobile app (Cassia & Magno, 2024) and well-distributed moving trucks/vans to collect the untouched food and then distribute it to booths or branches will solve such issues.

Additionally, the NGOs and governments have a responsibility to raise the customer's religious awareness and encourage religious commitment to reduce their food waste behaviour. Moreover, there is an urgent need to fight the ads and campaigns that increase the materialistic values among the population.

Moreover, a significant portion of Muslim communities rely on open markets for their grocery needs. To ensure food safety and reduce waste, governments and policymakers should implement regulations in these markets. These regulations should not only focus on price control but also prioritize food hygiene and waste reduction. By implementing stricter hygiene standards, governments can minimize the risk of foodborne illnesses. Regular inspections, proper sanitation facilities, and employee training can significantly improve the overall cleanliness and safety of open markets. Additionally, by promoting sustainable practices and encouraging the reduction of food waste, policymakers can contribute to a more environmentally friendly and resource-efficient food system. Ultimately, by taking proactive steps to regulate open markets, governments can safeguard public health, reduce food waste, and contribute to a more sustainable future for Muslim communities.

It is also vital to initiate one centralized general authority to collect all the Muslim donations in each country. Such authority regulated the donation collection either in financial or non-financial forms. Then, it should distribute it to the needy people only. It is worth noting that Muslim donations, either obligatory or charitable, are deducted after the tax and health insurance. It is required only from rich people who can afford to have money or gold (that equals 85g of gold or more as savings, not personal use) for at least one year from their net income. Therefore, it is vital to have such authority to regulate the donation collection and redistribute it instead of the unsafe ways of knocking on doors and less accessible ways food banks.

7.3.4 Societal implications

Since living alone is mentioned to increase food waste behaviour, it is crucial for society to tighten the relationships between families and their extended families. In addition, friends and colleagues should understand the importance of fighting the isolation for the whole community and for food waste generation.

Moreover, the whole community should stand shoulder to shoulder since they perceive the food waste value in money. This can be sustained by highlighting the monetary value of the food waste management campaigns. Such campaigns can support community connectedness. More specifically, the monetary value of the food waste that can be given to needy people should be highlighted to reduce the gap between the two extreme levels of social life in the same society. This indeed will help in reducing the feeling of life dissatisfaction and crime in society. In addition, in distress and pandemics, people suffer from psychological issues, and they may act accordingly. Therefore, it is vital to remind them about the impact of unethical behaviours (i.e., food waste behaviour) and their related consequences in line with the Justification-Suppression Model (Veer & Shankar, 2011).

In addition, the current research sample revealed reasonable amounts of wasted food from the hosted banquets. Such unethical and irrespirable behaviour is understood by its actors. Therefore, people still do not appreciate the food they waste. For instance, more than 21k died every day due to hunger feeling. Such numbers can be highlighted by governments and businesses to raise awareness about the starvation that is very close to them. Nowadays, countries are very easy to fall in bankruptcy trap, with no solutions to feed their populations. The irresponsible behaviour should be diminished in order to save lives and economies.

Finally, people should be aware of the dangers of being materialistic as it increases their food waste behaviour. Therefore, they should fight it for themselves and their dependents. They should be careful as they may need to boycott a lot of internet applications and TV ads. Hence, regulating such channels will be better to reduce their dangerous consequences, not only for the kids but also for the whole community.

7.3.5 Ethical implications

The food waste behaviour has been mentioned as disgusting behaviour on the X platform. However, people lack the tactics to reduce it. In this regard, enhancing the awareness of such unethical behaviour may lead to self-developed tactics to reduce it, such as planned purchases or leftover reuse applications from the internet.

Moreover, since the monetary value is used to describe the food waste, retailers and their supply chains who deceive the customer by offering discounts and ignoring the food waste value are creating an unethical image in their customers. Also, customers should be aware of the dangers of abandoning Corporate Social Responsibility, especially food waste management, as they are not the sole responsible for it.

In addition, the main reason for increasing food waste is the unplanned and uninvited guests to the banquets. Indeed, such unethical behaviour is dangerous not only to increase food waste but also to reduce banquets and connectedness due to family privacy breaches. In line with this, Islamic teachings deny such a parasite's behaviour as the invited guests are committed to leaving the host house directly after eating the food of the banquet. For instance, God says, *"O you who have believed, do not enter the houses of the Prophet except when you are permitted for a meal, without awaiting its readiness. But when you are invited, then enter; and when you have eaten, disperse without seeking to remain for conversation. Indeed, that [behaviour] was troubling the Prophet, and he is shy of [dismissing] you. But Allah is not shy of the truth...."* (Qur'an 33,53).

Moreover, it has been clearly mentioned that materialism increases food waste behaviour. Therefore, one should not only fight it but also be keen on raising her/his kids without it. The three dimensions of materialism: centrality acquisition, happiness, and success are dangerous to the community. However, the success itself is responsible for increasing the food waste. For instance, it is obviously mediating the negative relationship between religious commitment and food waste behaviour. Therefore, the criteria used to judge success should be changed from materialistic values to more spiritual or religious ones. This also means that the acquisition and happiness are responsible for the food waste, but

at the same time, they do not bring the desired outcome as the success dimensions. Therefore, it is vital to fight for materialism to diminish and raise ethical and responsible behaviours.

In the same vein, from the social identity theory, success may be responsible for reconstructing the lost membership. However, the whole in-group network should be reviewed against the materialistic values. Those with high materialistic values should be excluded as their danger is unbearable. For instance, the network of relatives and friends that have low materialistic values is better to be wider. Yet, such a network should be extended to include non or low-materialistic persons. Otherwise, the religious teachings encourage people to keep the relationship limited with those with unethical and low religious commitments.

In addition, people showed that their feelings of loneliness can lead them to follow unethical behaviour, even when they know it is unethical and against their religious beliefs. The Justification-Suppression Model (Veer & Shankar, 2011) have grounded their reasoning behind such behaviours. However, people should be aware that the consequences of their irresponsible behaviour can kill people, and they need to ensure that in distress time, they simply need to act in a responsible and ethical manner. Additionally, the self-discrepancy between the ideal, out, and actual selves may cause the feeling of emotional loneliness. Thus, more self-congruency is needed to reduce such undesirable feelings and their consequences.

Finally, the compensation behaviour that gains its legitimacy from the Justification-Suppression Model takes many forms, such as eating, shopping, social media browsing...etc. However, people need to be aware of such compensatory behaviour. Lonely people need to regulate their feelings so as not to be addicted to the compensation behaviour. For instance, unplanned shopping or eating will help mitigate the feeling of loneliness. However, exaggerated or addictive eating or shopping behaviour will result in health and money risks. In addition, emotional loneliness increases all the dimensions of materialism. This means that it most likely causes the addiction of the compensator behaviour.

7.4 Chapter summary:

This concluding chapter aims to summarize the main research findings and propose relevant implications and recommendations for scholars, business leaders, policymakers, societal and community activists, and ethical-minded consumers.

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Appendices

Appendix (A) first ethical plan approval

<p style="text-align: center;">RESEARCH ETHICS COMMITTEE</p> <p style="text-align: center;">FORM D – Staff, Post Graduate Students, and UG Dissertations</p> <p style="text-align: center;">(Involving human participants)</p>

Applications by members of Staff, by Post-Graduate students, and by UG students who write Dissertations.

This form should be filled only if they are conducting research that involves human participants and/or animals:

SUBMISSION CHECKLIST

Staff only:

I have completed the Research Integrity module on the e learning portal **Yes/No**
<https://hull.learnapon.com/dashboard>

Indicate with 'X' the documents that have been included with this application.

Fully completed application form ☐

Completed risk assessment ☐

Recruitment materials – with date and version number)
(e.g. poster or email used to invite people to participate) ☐

Consent form(s) – with date and version number
(different version for each group of participants) ☐

Letter or email seeking permission from gatekeeper/host ☐

Questionnaire(s) – with date and version number ☐

If conducting a student survey, confirm that it fits with University policy ☐
<https://share.hull.ac.uk/Services/Governance/PolicyDocuments/Policy on Student Surveys.docx>

Interview questions / topic guide – with date and version number ☐

Other (please specify) ☐

Data management plan (see section F2) ☐

Ethics reference number (for office use):	
WorkTribe project URL	

PART A: SUMMARY

A.1 Title of the research

Studying the food waste behaviour of Muslim households in the holy month of Ramadan

A.2 Principal investigator's contact details

Name (<i>Title, first name, surname</i>)	Hassan Mohamed
Position	PhD student
Faculty/School	Faculty of Business, Law and Politics / Hull University Business School
Telephone number	07594843192
University of Hull email address	h.m.mohamed-2019@hull.ac.uk

A.3 To be completed by students only

Qualification working towards (e.g. Masters, PhD, ClinPsyD)	PhD Marketing
Student number	201942578
Supervisor's name (<i>Title, first name, surname</i>)	Dr Nilanthi Ratnayake
Faculty/ School	Faculty of Business, Law and Politics / Hull University Business School
Supervisor's telephone number	+44 (0)1482 463208
Supervisor's email address	N.Ratnayake@hull.ac.uk

A.4 Other relevant members of the research team (e.g. co-investigators, co-supervisors)

Name (<i>Title, first name, surname</i>)	Dr Gunjan Saxena
Position	Professor (2 nd supervisor)
Faculty/ School	Faculty of Business, Law and Politics / Hull University Business School
Telephone number	+44 (0)1482 463970
Institution	University of Hull
Email address	G.Saxena@hull.ac.uk

A.5 Select from the list below to describe your research: (Mark with X all that apply)

- ☒ Research on or with human participants
- ☒ Research working with data of human participants

<input type="checkbox"/>	New data collected from observing individuals or populations
<input checked="" type="checkbox"/>	Research using already published data or data in the public domain
<input type="checkbox"/>	Research involving discussion of sensitive topics or topics that could be considered sensitive
<input type="checkbox"/>	Research using confidential data
<input type="checkbox"/>	Prolonged or frequent participant involvement
<input type="checkbox"/>	Research involving members of the public in a research capacity (participant research)
<input checked="" type="checkbox"/>	Research conducted outside the UK
<input checked="" type="checkbox"/>	Research involving accessing social media sites
<input type="checkbox"/>	Research involving accessing or encountering security sensitive material
<input type="checkbox"/>	Research involving accessing websites or material associated with extreme or terrorist communities
<input type="checkbox"/>	Research involving storing or transmitting any material that could be interpreted as sympathetic, endorsing or promoting terrorist acts
<input type="checkbox"/>	Research involving financial inducements for participants (other than reasonable expenses and compensation for time)

PART B: THE RESEARCH

B.1 Give a short summary of the research (max 300 words)

*This section must be completed in **language comprehensible to the lay person**.*

In plain English provide a brief summary of the aims and objectives of the research.

- The summary should briefly describe the background to the research and why it is important,
- the questions it will answer and potential benefits,
- the study design and what is involved for participants.

The current PhD research project aims at studying the food waste behaviour among Muslim families in the holy month of Ramadan. There are four main objectives of this research. First, studying the effect of the personal religiosity on the food waste generation. Second, measuring the effect of psychological drivers to the food waste behaviour such as feeling loneliness, self-discrepancy, and materialism. Third, specifying the best practices of reducing the generated food waste. Forth, determining to what extent the food waste management practices can enhance the responsible consumption behaviour.

The current research fills the gap in the literature in three ways. First, this project fills the gap of studying the Islamic religiosity effect along with other psychological drivers that are boosted during the COVID-19 pandemic on the food waste behaviour and its reduction practices in the Islamic season, the holy month of Ramadan. Second, the current literature in the food waste and consumer behaviour entails only the food waste behaviour of individuals. Hence, there is a paucity in studying the group "household" unit of analysis. In addition, the current research oriented to women role in generating the food waste as she is the housewife, mother, and most importantly, responsible for preparing the food for her family. Forth, the ongoing research specifies the most convenient strategy to reduce the food waste which is more clarified by studying the role of trust, food volume, and other moderation variables.

This Exploratory descriptive research depends on the single cross-sectional design by surveying women in Muslim households using semi-structural questionnaire. Also, it includes collecting the tweets that includes the “food waste” words to explore the relevant themes.

B.2 Proposed study dates and duration

Research start date (DD/MM/YY): 27/01/2020 Research end date (DD/MM/YY): 26/01/2024

Fieldwork start date (DD/MM/YY): 1/04/2020 Fieldwork end date (DD/MM/YY): 1/07/2020

B.3 Where will the research be undertaken? (i.e. in the street, on University of Hull premises, in schools, on-line etc.) On-line

Do you have permission to conduct the research on the premises?

☐ Yes ☐ No

If no, please describe how this will be addressed.

B.4 Does the research involve any risks to the researchers themselves, or people not directly involved in the research? *E.g. lone working*

☐ Yes ☒ No

If yes, please describe and say how these will be addressed (include reference to relevant lone working policies): _____

If yes, please include a copy of your completed risk assessment form with your application.

NB: If you are unsure whether a risk assessment is required visit the Health and Safety SharePoint site. Risk assessments are required for all fieldwork taking place off campus.

B.5 What are the main ethical issues with the research and how will these be addressed? *Indicate any issues on which you would welcome advice from the ethics committee*

B.6 Does the research involve an international collaborator or research conducted overseas:

☐ Yes ☒ No

If yes, describe any ethical review procedures that you will need to comply with in that country:

Describe the measures you have taken to comply with these:

Include copies of any ethical approval letters/ certificates with your application.

PART C: HUMAN PARTICIPANTS AND SUBJECTS

C.1 Who are the participants? Responsible women for preparing food in their Muslim households for the exploratory survey and any Twitter user for the Twitter data.

C.2 Are the participants expected to be from any of the following groups? (Mark with X as appropriate)

- ☐ Children under 16 years old. *Specify age group:* _____
- ☐ Adults with learning disabilities
- ☐ Adults with other forms of mental incapacity or mental illness
- ☐ Adults in emergency situations
- ☐ Prisoners or young offenders
- ☐ Those who could be considered to have a particularly dependent relationship with the investigator, e.g. members of staff, students
- ☐ Other vulnerable groups
- ☒ No participants from any of the above groups

Include in Section D5 details of extra steps taken to assure their protection.

Does your research require you to have a DBS check?

☐ Yes ☒ No

It is the researcher's responsibility to check whether a DBS check (or equivalent) is required and to obtain one if it is needed. See also <http://www.homeoffice.gov.uk/agencies-public-bodies/dbs>

C.3 What are the potential benefits and/ or risks for research participants in both the short and medium-term?

Risks may include health and safety, physical harm and emotional well-being

There is no risk in answering the online questionnaire or downloading the published tweets.

What will be done to avoid or minimise the risks?

C.4 Is there a potential for criminal or other disclosures to the researcher requiring action to take place during the research? (e.g. during interviews/group discussions, or use of screen tests for drugs?)

☐ Yes ☒ No

If yes, please describe and say how these will be addressed:

C.5 What will participants be asked to do in the study? (e.g. number of visits, time involved, travel required, interviews)

They will be asked about their eating style, food waste types, food waste in Ramadan, and food waste management.

PART D: RECRUITMENT & CONSENT PROCESSES

How participants are recruited is important to ensure that they are not induced or coerced into participation. The way participants are identified may have a bearing on whether the

results can be generalised. Explain each point and give details for subgroups separately if appropriate. Also say who will identify, approach and recruit participants. Remember to include all advertising material (posters, emails etc) as part of your application.

D.1 Describe how potential participants in the study be identified, approached and recruited and who will do this:

(i) identified: (filtering questions about the marital status, gender, and religion). In terms of X, the tweet must include the “food waste” keyword to be downloaded.

(ii) approached: Sending the link of the online questionnaire using convenience and snowball sampling technique. Creating twitter developer account and get the token information to download the data related to my project.

(iii) recruited: Explaining the research aim and objectives, introducing the researcher and the data collection role in his PhD project, expected time to answer, availability to withdraw at any stage, the anonymous coding for each questionnaire personal data will not be required. As well as, explaining the importance of the research and how the family food waste can be mitigated through them. Also, in Twitter, any tweet includes “food waste” constitute the population that will be exposed to random sampling procedure by 1% or 18000 tweets per day.

D.2. Do you intend to identify participants by name? If yes, explain why
No

D.3 Will the research involve any element of deception?

<input type="checkbox"/>	Y
--------------------------	---

<input checked="" type="checkbox"/>	X
-------------------------------------	---

<input type="checkbox"/>	N
--------------------------	---

If yes, please describe why this is necessary and whether participants will be informed at the end of the study.

D.4 Will informed consent be obtained from the research participants?

<input checked="" type="checkbox"/>	X
-------------------------------------	---

<input type="checkbox"/>	Y
--------------------------	---

<input type="checkbox"/>	N
--------------------------	---

If yes, give details of how it will be done. Give details of any particular steps to provide information (in addition to a written information sheet) e.g. videos, interactive material. If you are not going to be obtaining informed consent, you will need to justify this.

A formal consent will be collected through clicking on a “Agree to complete the survey” tab at the beginning of the questionnaire after reading the research aim and objectives, ability to withdraw at any stage, expected time to answer, the role of the survey in the PhD research project. There is no need to get the consent to download a publicly posted tweets.

If participants are to be recruited from any of potentially vulnerable groups, give details of extra steps taken to assure their protection. Describe any arrangements to be made for obtaining consent from a legal representative.

Copies of any written consent form, questionnaire, written information and all other explanatory material should accompany this application. The information sheet should make explicit that participants can withdraw from the research at any time, if the research design permits. Remember to use meaningful file names and version control to make it easier to keep track of your documents.

D.5 Describe whether participants will be able to withdraw from the study, and up to what point (e.g. if data is to be anonymised). If withdrawal is not possible, explain why not.

Any limits to withdrawal, e.g. once the results have been written up or published, should be made clear to participants in advance, preferably by specifying a date after which withdrawal would not be possible. Make sure that the information provided to participants (e.g. information sheets, consent forms) is consistent with the answer to D6.

Withdrawal is applicable at any time in the survey by closing the survey from the browser. Each submitted questionnaire or tweet will have a reference number in order to maintain the anonymisation.

D.6 Will individual or group interviews/ questionnaires discuss any topics or issues that might be sensitive, embarrassing or upsetting, or is it possible that criminal or other disclosures that require action (for instance, pertaining to child protection) could take place during the study (e.g. during interviews or group discussions)? The information sheet should explain under what circumstances action may be taken.

☐ Y ☒ N

If yes, give details of procedures in place to deal with these issues.

D.7 Will individual research participants receive any payments, fees, reimbursement of expenses or any other incentives or benefits for taking part in this research?

☐ Y ☒ N

If Yes, please describe the amount, number and size of incentives and on what basis this was decided.

PART E: RESEARCH DATA

Please read <http://libguides.hull.ac.uk/researchdata>

E.1 Explain what measures will be put in place to protect personal data. E.g. anonymisation procedures and coding of data. Any potential for re-identification should be made clear to participants in advance.

JISC online data collection platform gives unique reference number to each questionnaire; hence, the privacy will be kept by the anonymisation.

E.2 Does the research involve sensitive topics or confidential data? If yes, explain.

No

E.3. What security measures are place to ensure secure storage of data at any stage of the research?

Provide details on where personal data will be stored, any of the following: (mark with X all that apply)

<input checked="" type="checkbox"/>	University approved cloud computing services
<input checked="" type="checkbox"/>	Other cloud computing services
<input type="checkbox"/>	Manual files
<input type="checkbox"/>	Private company computers
<input checked="" type="checkbox"/>	Portable devices
<input type="checkbox"/>	Home or other personal computers (not recommended; data should be stored on Hull server such as your G,T, X or Z: drive where it is secure and backed up regularly)

Please attach the data management plan in the appendices; for further information visit <http://libguides.hull.ac.uk/researchdata>

E.4 Who will have access to participant's personal data during the study?
Student and his supervisors

E.5 Where will the data generated by the research be analysed and by whom?
The student will analyse the data with his supervisors only.

E.6 Who will have access and act as long term custodian for the research data generated by the study?
University of Hull

E.7 Have all researchers that have access to the personal data that will be collected as part of the research study, completed the University (or equivalent) data protection training?

☒ Yes ☐ No

It is mandatory that all researchers accessing personal data have completed data protection training prior to commencing the research.
<https://share.hull.ac.uk/Services/StaffDevelopment/SitePages/eLearning%20-%20Courses.aspx>

E.8 Will the research involve any of the following activities at any stage (including identification of potential research participants)? (Select all that apply)

<input type="checkbox"/>	Examination of personal records by those who would not normally have access
<input type="checkbox"/>	Access to research data on individuals by people from outside the research team
<input checked="" type="checkbox"/>	Electronic surveys, please specify survey tool: JISC online survey
<input type="checkbox"/>	Other electronic transfer of data
<input type="checkbox"/>	Use of personal addresses, postcodes, faxes, e-mails or telephone numbers
<input type="checkbox"/>	Use of audio/ visual recording devices (NB this should usually be mentioned in the info provided to participants)

E.9 Are there any reasons to prevent or delay the publication of this research? E.g. Commercial embargoes, sensitive material.

☐ Yes ☒ No

If yes, provide details:

E.10 If there are restrictions on where this research should be published or reported, Where will the results of this study be disseminated? (Select all that apply)

- ☒ Conference presentation
☒ Peer reviewed journals
☒ Publication as an eThesis in the Institutional repository HYDRA
☒ Publication on website
☐ Other publication or report, please state: _____
☒ Submission to regulatory authorities
☐ Other, please state: _____
☐ No plans to report or disseminate the results

E.11 How long will research data from the study be stored?

years

E.12 When will the personal data collected during the study be destroyed and how? After the passing the PhD viva and accepting the publications from the data, it can be removed from the University of Hull archive, various clouds, and USB HDD.

Researchers must comply with the General Data Protection Regulations that are live from May 2018.

PART F: CONFLICTS OF INTEREST

F.1 Will any of the researchers or their institutions receive any other benefits or incentives for taking part in this research over and above normal salary or the costs of undertaking the research?

☐ Yes ☒ No

If yes, indicate how much and on what basis this has been decided

F.2 Is there scope for any other conflict of interest? For example, could the research findings affect any ongoing relationship between any of the individuals or organisations involved and the researcher(s)? Will the research funder have control of publication of research findings?

☐ Yes ☒ No

If so, please describe this potential conflict of interest, and outline what measures will be taken to address any ethical issues that might arise from the research.

F.3 Does the research involve external funding? (Tick as appropriate)

☐ Yes ☒ No

If yes, what is the source of this funding? _____

Declaration by Principal Investigator

- 1 The information in this form is accurate to the best of my knowledge and belief.
2. I take full responsibility for the information I have supplied in this document.

3. I undertake to abide by the University's ethical and health and safety guidelines, and the ethical principles underlying good practice guidelines appropriate to my discipline.
4. I will seek the relevant School Risk assessment/COSHH approval if required.
5. If the research is approved, I undertake to adhere to the project protocol, the terms of this application and any conditions set out by the Faculty Research Ethics Committee.
6. Before implementing substantial amendments to the protocol, I will submit an amendment request to the Faculty Research Ethics Committee seeking approval.
7. If requested, I will submit progress reports.
8. I am aware of my responsibility to be up to date and comply with the requirements of the law and relevant guidelines relating to security and confidentiality of participants or other personal data, including the need to register when necessary with the appropriate Data Protection Officer.
9. I understand that research records/data may be subject to inspection for audit purposes if required in future.
10. I take full responsibility for the actions of the research team and individuals supporting this study, thus all those involved will be given training relevant to their role in the study.
11. By signing the validation I agree that the Faculty Research Ethics Committee, on behalf of the University of Hull, will hold personal data in this application and this will be managed according to the principles established in the Data protection Act (1998).

Sharing information for training purposes: Optional – please mark with X as appropriate:

☒

I would be content for members of other Research Ethics Committees to have access to the information in the application in confidence for training purposes. All personal identifiers and references to researchers, funders and research units would be removed.

Principal Investigator

Signature of Principal Investigator: Hassan Mohamed

(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name:

Hassan Mohamed

Date: (dd/mm/yyyy): 20/3/2020

Reviewer



Signature of Reviewer:

(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Gunjan Saxena
25/03/2020

Date: (dd/mm/yyyy):

Supervisor of UG and PG student research: I have read, edited and agree with the form above.



Supervisor's signature: (second supervisor)
(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name: Gunjan Saxena
25/03/2020

Date: (dd/mm/yyyy):

[mailto:](#)**Remember to include any supporting material** such as your participant information sheet, consent form, interview questions and recruitment material with your application. Version control should be adopted to include the version number and date on relevant documents in the appendices. **These should be pasted as Appendices to this form.**

One copy of the form should be kept by the researcher, one copy should be retained by the Ethics Officer and one copy should be sent by email to fblp-researchadmin@hull.ac.uk

For staff, PGR students and UG writing dissertations undertaking more complex research (particularly if this involves human participation or more significant ethical considerations) we would usually expect the following:

- **Form D** - Research Ethics Proforma (completed and signed);
- **Form E** - Invitation, Information and Informed Consent (completed);
- Detailed methodology;
- Sampling method;
- Designated sample: who are the participants, including their age;
- Consent form;
- Questionnaire.
- Data Management Plan

Appendix (B) Exploratory survey questionnaire

Preferred language:

Please select your preferred language:

- ☐ English
- ☐ Arabic

Study consent:

Hello, I am Hassan Mohamed, pursuing a Ph.D. in Marketing at Hull University Business School, carrying out a short survey (5 minutes) on the issue of food waste management among Muslim families in the holy month of Ramadan. Please note that data will be anonymously coded and confidentially treated. Please mail me at h.m.mohamed-2019@hull.ac.uk if you will like a summary of my findings. You can withdraw at any stage of research and have the right to retrieve your data.

- (confirm)

Your preferred contact (Email address, telephone number) please!

- (.....)

Demographics:

Age (in years):

Less than 20	
20 to less than 30	
30 to less than 40	
40 to less than 50	
50 to less than 60	
60+	

Education level:

Less than high school	
High school	
Graduate	
Post-graduate	
Other	
Please specify: (.....)	

Work:

Unemployed housewife	
Retired	
Part time	
Full time	

Managerial level if you are working:

Direct management	
Middle management	
Top management	

Family monthly income:

Less than \$500	
From \$500 to less than \$1000	
From \$1000 to less than \$3000	
\$3000+	

Marital status:

Married	
Married with children	
Divorced	
Divorced with children	
Widowed	
Widowed with children	

Number of family members living with you (.....)

Country of residence:

Egypt		UAE	
Morocco		Bahrain	
KSA		Algeria	
Oman		Lebanon	
Tunisia		Kuwait	
Jordan		Qatar	
Others: please specify (.....)			

Household chores

How many banquets does your family usually host in Ramadan? (.....)

What do you do with the food that you do not eat?

- ☐ Throw it away
- ☐ Give it to poor
- ☐ Keep it in the fridge
- ☐ reuse it
- ☐ feed animals with it
- ☐ Other, please specify.....

Eating style, awareness, and involvement

Vegans do not eat any animal products, such as meat, fish, eggs, milk, cheese, or honey.

Vegetarians: who do not eat the products or by-products of animal and fish slaughter, such as meat and fish.

Flexitarians: who are vegans but occasionally eat meat when unable to get vegetable food.

According to this eating styles, you are:

- ☐ Vegan
- ☐ Vegetarian
- ☐ Flexitarian
- ☐ Do not follow a specific eating style

Does your eating style result in food waste? * *Required*

- ☐ Yes
- ☐ No
- ☐ How?.....

Statement from 1=strongly agree to 7=strongly disagree	1	2	3	4	5	6	7
The Holy Qur'an says, " <i>Children of Adam, Eat and drink, and do not waste. He does not love the wasteful</i> " (Qur'an 7, 31). I follow this rule to reduce food waste and obey God's order.							
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>Mention Allah's Name (i.e., say Bismillah), eat with your right hand, and eat from what is in front of you</i> ". I follow this rule to reduce the food waste by keeping the leftover untouched.							
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>Whoever among you wakes up physically healthy, feeling safe and secure within himself, with food for the day, it is as if he acquired the whole world</i> ". I follow this rule to reduce the food waste by buying only the needed food for the day.							
Our prophet (PBUH) says regarding the ethics of eating the food, " <i>He also commanded us that we should wipe the dish saying: You do not know in what portion of your food the blessing lies.</i> ". I follow this rule to reduce the food waste by accurately estimate the food per dish.							

Statement from 1=strongly agree to 7=strongly disagree	1	2	3	4	5	6	7
Our prophet (PBUH) says regarding the ethics of eating the food, “ <i>When any one of you drops a mouthful, he should remove anything filthy from it and then eat it and should not leave it for the Satan</i> ”. I follow this rule to reduce the food waste by eating the whole presented food.							

How many times does your family eat the leftovers per week in Ramadan?

(.....)

Would you please state a name of the food waste campaign you often follow?

(.....)

Food waste categories and drivers

Statement from 1=strongly agree to 7=strongly disagree	1	2	3	4	5	6	7
I throw the food waste before it expires.							
My family waste the food in the breakfast meal in Ramadan.							
My family waste the food in the pre-fasting (Sohour) meal in Ramadan.							
Wasting the food in the beginning of Ramadan is more than the end of the holy month.							
I can categorize the food waste into edible and non-edible food.							

What are the kinds of food waste your family usually have in Ramadan?

How much does your family waste the food in Ramadan per meal?

Would you please categorize them according to the perceived food value for you?

Usually, I buy the food for my family from:

- ☐ Farms
- ☐ open markets
- ☐ retailers
- ☐ Other
- ☐ If you selected Other, please specify:

How often do you buy your family food per month?

Is it a regular basis?

- ☐ Yes
☐ No

In Ramadan, the percentage of the food purchases per week to the family income is....%

In Ramadan, the estimated cost percentage of the food waste per week to the family income is....%

On scale from 1-7 please answer the following questions where (1) strongly agree and (7) strongly disagree on the following reasons causing **food waste in Ramadan**:

Statement	1	2	3	4	5	6	7
Lack of experience in preparing food with minimum waste							
Banquets							
Unplanned purchasing							
Exaggerated hunger due to fasting							
Non-edible food components							
Impossible to store some foods that need to be consumed as a whole							
The expiration date is not clear							
Food banks only accept untouched food waste from agencies and not individual households							
Underprivileged people do not accept the leftovers							
I cannot prepare a recipe from the leftover food							
Eating leftovers is not accepted in my family							

Panic buying occurs when consumers buy unusually large amounts of a product in anticipation of a disaster, a large price increase, or a supply shortage.

The panic buying due to COVID-19 is much closer to the Ramadan panic buying. How?

.....

Any other comments?

.....

Food waste management

This section is assigned to the food waste management practices' awareness, involvement, and intention. On a scale from 1-7, please answer the following questions where (1) strongly agree and (7) strongly disagree.

Statement	1	2	3	4	5	6	7
I prefer to buy from a retailer that has a disclosed food waste management policy.							
Usually, I prefer to gain the benefits of the discounts even if this increases food waste.							
I keep the leftovers in the fridge and eat them before is expiry							
I donate the untouched food							
I reuse the leftovers by finding a probable recipe for it							
I separate edible food waste from non-edible food waste							
I plan my family's food ingredients well							
I give the banquet guests their leftovers as a takeaway							
I feed leftovers to the animals							
I share leftovers with others							
I understand the economic consequences of the food waste							
I understand the societal consequences of food waste							
I understand the environmental consequences of the food waste							
I think my efforts to reduce food waste are enough							
I think companies, in my country, spent reasonable efforts to reduce food waste							

On a scale from 1-7, please answer the following questions where (1) strongly agree and (7) strongly disagree on your need to reduce the food waste

Statement	1	2	3	4	5	6	7
I need tips to reduce food waste							
I need more attractive and innovative ad content to highlight the issue							
I need recipes to cook the leftover							
I need food bank protocol with families							
I need hygienic food sharing regulations							

If you think the companies should spend more effort to mitigate food waste, what do you suggest?

.....

On a scale from 1-7, please answer the following questions where (1) strongly agree and (7) strongly disagree.

Statement	1	2	3	4	5	6	7
This research raised my awareness of food waste							
Food wasting is much higher at the beginning of Ramadan compared to the last days of it							
My family waste food from breakfast during Ramadan.							
My family waste the food in the pre-fasting (Sohour) meal in Ramadan							

Thank you for your time.

Appendix (C) Second ethical plan approval

RESEARCH ETHICS COMMITTEE

FORM D – Staff, Post Graduate Students, and UG Dissertations

(Involving human participants)

Applications by members of Staff, by Post-Graduate students, and by UG students who write Dissertations.

This form should be filled only if they are conducting research that involves human participants and/or animals:

SUBMISSION CHECKLIST

Staff only:

I have completed the Research Integrity module on the e learning portal **Yes/No**
<https://hull.learnupon.com/dashboard>

Indicate with 'X' the documents that have been included with this application.

Fully completed application form ☐

Completed risk assessment ☐

Recruitment materials – with date and version number)
(e.g. poster or email used to invite people to participate) ☐

Consent form(s) – with date and version number
(different version for each group of participants) ☐

Letter or email seeking permission from gatekeeper/host ☐

Questionnaire(s) – with date and version number ☐

If conducting a student survey, confirm that it fits with University policy ☐
<https://share.hull.ac.uk/Services/Governance/PolicyDocuments/Policy on Student Surveys.docx>

Interview questions / topic guide – with date and version number ☐

Other (please specify) ☐

Data management plan (see section F2) ☐

Ethics reference number (for office use):	
WorkTribe project URL	

PART A: SUMMARY**A.1 Title of the research**

Studying the food waste behaviour of Muslim households in the holy month of Ramadan

A.2 Principal investigator's contact details

Name (<i>Title, first name, surname</i>)	Hassan Mohamed
Position	PhD student
Faculty/School	Faculty of Business, Law and Politics / Hull University Business School
Telephone number	07594843192
University of Hull email address	h.m.mohamed-2019@hull.ac.uk

A.3 To be completed by students only

Qualification working towards (e.g. Masters, PhD, ClinPsyD)	PhD Marketing
Student number	201942578
Supervisor's name (<i>Title, first name, surname</i>)	Dr Nilanthi Ratnayake
Faculty/ School	Faculty of Business, Law and Politics / Hull University Business School
Supervisor's telephone number	+44 (0)1482 463208
Supervisor's email address	N.Ratnayake@hull.ac.uk

A.4 Other relevant members of the research team (e.g. co-investigators, co-supervisors)

Name (<i>Title, first name, surname</i>)	Dr Gunjan Saxena
Position	Professor (2 nd supervisor)
Faculty/ School	Faculty of Business, Law and Politics / Hull University Business School
Telephone number	+44 (0)1482 463970
Institution	University of Hull
Email address	G.Saxena@hull.ac.uk

A.5 Select from the list below to describe your research: (Mark with X all that apply)

- ☒ Research on or with human participants
- ☒ Research working with data of human participants
- ☐ New data collected from observing individuals or populations
- ☒ Research using already published data or data in the public domain

<input type="checkbox"/>	Research involving discussion of sensitive topics or topics that could be considered sensitive
<input type="checkbox"/>	Research using confidential data
<input type="checkbox"/>	Prolonged or frequent participant involvement
<input type="checkbox"/>	Research involving members of the public in a research capacity (participant research)
<input checked="" type="checkbox"/>	Research conducted outside the UK
<input checked="" type="checkbox"/>	Research involving accessing social media sites
<input type="checkbox"/>	Research involving accessing or encountering security sensitive material
<input type="checkbox"/>	Research involving accessing websites or material associated with extreme or terrorist communities
<input type="checkbox"/>	Research involving storing or transmitting any material that could be interpreted as sympathetic, endorsing or promoting terrorist acts
<input type="checkbox"/>	Research involving financial inducements for participants (other than reasonable expenses and compensation for time)

PART B: THE RESEARCH

B.1 Give a short summary of the research (max 300 words)

*This section must be completed in **language comprehensible to the lay person**.*

In plain English provide a brief summary of the aims and objectives of the research.

- The summary should briefly describe the background to the research and why it is important,
- the questions it will answer and potential benefits,
- the study design and what is involved for participants.

The current PhD research project aims at studying the food waste behaviour among Muslim families in the holy month of Ramadan. There are four main objectives of this research. First, studying the effect of the personal religiosity on the food waste generation. Second, measuring the effect of psychological drivers to the food waste behaviour such as feeling loneliness, self-discrepancy, and materialism. Third, specifying the best practices of reducing the generated food waste. Forth, determining to what extent the food waste management practices can enhance the responsible consumption behaviour.

The current research fills the gap in the literature in three ways. First, this project fills the gap of studying the Islamic religiosity effect along with other psychological drivers that are boosted during the COVID-19 pandemic on the food waste behaviour and its reduction practices in the Islamic season, the holy month of Ramadan. Second, the current literature in the food waste and consumer behaviour entails only the food waste behaviour of individuals. Hence, there is a paucity in studying the group "household" unit of analysis. In addition, the current research oriented to women role in generating the food waste as she is the housewife, mother, and most importantly, responsible for preparing the food for her family. Forth, the ongoing research specifies the most convenient strategy to reduce the food waste which is more clarified by studying the role of trust, food volume, and other moderation variables. This conclusive descriptive research depends on the single cross-sectional design by surveying women in Muslim households using structural questionnaire.

B.2 Proposed study dates and duration

Research start date (DD/MM/YY): 27/01/2020 Research end date (DD/MM/YY): 26/01/2024

Fieldwork start date (DD/MM/YY): 15/05/2021 Fieldwork end date (DD/MM/YY): 15/06/2021

B.3 Where will the research be undertaken? (i.e. in the street, on University of Hull premises, in schools, on-line etc.) On-line

Do you have permission to conduct the research on the premises?

☐ Yes

☐ No

If no, please describe how this will be addressed.

B.4 Does the research involve any risks to the researchers themselves, or people not directly involved in the research? *E.g. lone working*

☐ Yes

☒ No

If yes, please describe and say how these will be addressed (include reference to relevant lone working policies): _____

If yes, please include a copy of your completed risk assessment form with your application.

NB: If you are unsure whether a risk assessment is required visit the Health and Safety SharePoint site. Risk assessments are required for all fieldwork taking place off campus.

B.5 What are the main ethical issues with the research and how will these be addressed?
*Indicate any issues on which you would welcome advice from the ethics committee***B.6 Does the research involve an international collaborator or research conducted overseas:**

☐ Yes

☒ No

If yes, describe any ethical review procedures that you will need to comply with in that country:

Describe the measures you have taken to comply with these:

Include copies of any ethical approval letters/ certificates with your application.

PART C: HUMAN PARTICIPANTS AND SUBJECTS

C.1 Who are the participants? Responsible women for preparing food in their Muslim households

C.2 Are the participants expected to be from any of the following groups? (Mark with X as appropriate)

- ☐ Children under 16 years old. *Specify age group:* 21+ _____
- ☐ Adults with learning disabilities
- ☐ Adults with other forms of mental incapacity or mental illness
- ☐ Adults in emergency situations
- ☐ Prisoners or young offenders
- ☐ Those who could be considered to have a particularly dependent relationship with the investigator, e.g. members of staff, students
- ☐ Other vulnerable groups
- ☒ No participants from any of the above groups

Include in Section D5 details of extra steps taken to assure their protection.

Does your research require you to have a DBS check?

☐ Yes ☒ No

It is the researcher's responsibility to check whether a DBS check (or equivalent) is required and to obtain one if it is needed. See also <http://www.homeoffice.gov.uk/agencies-public-bodies/dbs>

C.3 What are the potential benefits and/ or risks for research participants in both the short and medium-term?

Risks may include health and safety, physical harm and emotional well-being

There is no risk in answering the online questionnaire. However, it may increase the participants awareness about the social media role in increasing the food waste.

What will be done to avoid or minimise the risks?

C.4 Is there a potential for criminal or other disclosures to the researcher requiring action to take place during the research? (e.g. during interviews/group discussions, or use of screen tests for drugs?)

☐ Yes ☒ No

If yes, please describe and say how these will be addressed:

C.5 What will participants be asked to do in the study? (e.g. number of visits, time involved, travel required, interviews)

They will be asked about their social media addiction behaviour, loneliness, compensating behaviour, materialism, Banquets behaviour, ethical consumption behaviour, and possible alternatives to reduce the food waste.

PART D: RECRUITMENT & CONSENT PROCESSES

How participants are recruited is important to ensure that they are not induced or coerced into participation. The way participants are identified may have a bearing on whether the

results can be generalised. Explain each point and give details for subgroups separately if appropriate. Also say who will identify, approach and recruit participants. Remember to include all advertising material (posters, emails etc) as part of your application.

D.1 Describe how potential participants in the study be identified, approached and recruited and who will do this:

(i) identified: (filtering questions about the marital status, gender, and religion)

(ii) approached: Sending the link of the online questionnaire using convenience and snowball sampling technique

(iii) recruited: Explaining the research aim and objectives, introducing the researcher and the data collection role in his PhD project, expected time to answer, availability to withdraw at any stage, the anonymous coding for each questionnaire personal data will not be required. As well as, explaining the importance of the research and how the family food waste can be mitigated through them.

D.2. Do you intend to identify participants by name? If yes, explain why

No

D.3 Will the research involve any element of deception?

	Y
--	---

x	N
---	---

If yes, please describe why this is necessary and whether participants will be informed at the end of the study.

D.4 Will informed consent be obtained from the research participants?

x	Y
---	---

	N
--	---

If yes, give details of how it will be done. Give details of any particular steps to provide information (in addition to a written information sheet) e.g. videos, interactive material. If you are not going to be obtaining informed consent you will need to justify this.

A formal consent of will be collected through clicking on a "Agree to complete the survey" tab at the beginning of the questionnaire after reading the research aim and objectives, ability to withdraw at any stage, expected time to answer, the role of the survey in the PhD research project.

If participants are to be recruited from any of potentially vulnerable groups, give details of extra steps taken to assure their protection. Describe any arrangements to be made for obtaining consent from a legal representative.

Copies of any written consent form, questionnaire, written information and all other explanatory material should accompany this application. The information sheet should

make explicit that participants can withdraw from the research at any time, if the research design permits. Remember to use meaningful file names and version control to make it easier to keep track of your documents.

D.5 Describe whether participants will be able to withdraw from the study, and up to what point (e.g. if data is to be anonymised). If withdrawal is not possible, explain why not.

Any limits to withdrawal, e.g. once the results have been written up or published, should be made clear to participants in advance, preferably by specifying a date after which withdrawal would not be possible. Make sure that the information provided to participants (e.g. information sheets, consent forms) is consistent with the answer to D6.

Withdrawal is applicable at any time in the survey by closing the survey from the browser. Each submitted questionnaire will have Reference number in order to maintain the anonymisation.

D.6 Will individual or group interviews/ questionnaires discuss any topics or issues that might be sensitive, embarrassing or upsetting, or is it possible that criminal or other disclosures that require action (for instance, pertaining to child protection) could take place during the study (e.g. during interviews or group discussions)? The information sheet should explain under what circumstances action may be taken.

<input type="checkbox"/>	Y
--------------------------	---

<input checked="" type="checkbox"/>	N
-------------------------------------	---

If yes, give details of procedures in place to deal with these issues.

D.7 Will individual research participants receive any payments, fees, reimbursement of expenses or any other incentives or benefits for taking part in this research?

<input checked="" type="checkbox"/>	Y
-------------------------------------	---

<input type="checkbox"/>	N
--------------------------	---

If Yes, please describe the amount, number and size of incentives and on what basis this was decided.

A 5 questionnaires will be randomly selected from the valid and complete questionnaires to receive a prize of £50 per each (or equal local currency to the selected questionnaire). The random selection using the unique reference number will be based on SPSS software (select random 5 IDs).

These prizes' terms and conditions will be introduced before approaching the questionnaire link in order to increase the response rate.

PART E: RESEARCH DATA

Please read <http://libguides.hull.ac.uk/researchdata>

E.1 Explain what measures will be put in place to protect personal data. E.g. anonymisation procedures and coding of data. Any potential for re-identification should be made clear to participants in advance.

JISC online data collection platform gives unique reference number to each questionnaire, hence, the privacy will be kept by the anonymisation.

E.2 Does the research involve sensitive topics or confidential data? If yes, explain.

No

E.3. What security measures are place to ensure secure storage of data at any stage of the research?

Provide details on where personal data will be stored, any of the following: (mark with X all that apply)

- | | |
|--|--|
| <input checked="checked" type="checkbox"/> | University approved cloud computing services |
| <input checked="checked" type="checkbox"/> | Other cloud computing services |
| <input type="checkbox"/> | Manual files |
| <input type="checkbox"/> | Private company computers |
| <input checked="checked" type="checkbox"/> | Portable devices |
| <input type="checkbox"/> | Home or other personal computers (not recommended; data should be store
Hull server such as your G,T, X or Z: drive where it is secure and backed up re |

Please attach the data management plan in the appendices; for further information visit <http://libguides.hull.ac.uk/researchdata>

E.4 Who will have access to participant's personal data during the study?

Student and his supervisors

E.5 Where will the data generated by the research be analysed and by whom?

The student will analyse the data with his supervisors only.

E.6 Who will have access and act as long term custodian for the research data generated by the study?

University of Hull

E.7 Have all researchers that have access to the personal data that will be collected as part of the research study, completed the University (or equivalent) data protection training?

☒ Yes

☐ No

It is mandatory that all researchers accessing personal data have completed data protection training prior to commencing the research.

<https://share.hull.ac.uk/Services/StaffDevelopment/SitePages/eLearning%20-%20Courses.aspx>

E.8 Will the research involve any of the following activities at any stage (including identification of potential research participants)? (Select all that apply)

- | | |
|--|---|
| <input type="checkbox"/> | Examination of personal records by those who would not normally have access |
| <input type="checkbox"/> | Access to research data on individuals by people from outside the research team |
| <input checked="checked" type="checkbox"/> | Electronic surveys, please specify survey tool: JISC online survey |
| <input type="checkbox"/> | Other electronic transfer of data |
| <input type="checkbox"/> | Use of personal addresses, postcodes, faxes, e-mails or telephone numbers |
| <input type="checkbox"/> | Use of audio/ visual recording devices (NB this should usually be mentioned in the info participants) |

E.9 Are there any reasons to prevent or delay the publication of this research? E.g. Commercial embargoes, sensitive material.

☐ Yes ☒ No

If yes, provide details:

E.10 If there are restrictions on where this research should be published or reported, Where will the results of this study be disseminated? (Select all that apply)

- ☒ Conference presentation
☒ Peer reviewed journals
☒ Publication as an eThesis in the Institutional repository HYDRA
☒ Publication on website
☐ Other publication or report, please state: _____
☒ Submission to regulatory authorities
☐ Other, please state: _____
☐ No plans to report or disseminate the results

E.11 How long will research data from the study be stored?

years

E.12 When will the personal data collected during the study be destroyed and how? After the passing the PhD viva and accepting the publications from the data, it can be removed from the University of Hull archive, various clouds, and USB HDD.

Researchers must comply with the General Data Protection Regulations that are live from May 2018.

PART F: CONFLICTS OF INTEREST

F.1 Will any of the researchers or their institutions receive any other benefits or incentives for taking part in this research over and above normal salary or the costs of undertaking the research?

☐ Yes ☒ No

If yes, indicate how much and on what basis this has been decided

F.2 Is there scope for any other conflict of interest? For example, could the research findings affect any ongoing relationship between any of the individuals or organisations involved and the researcher(s)? Will the research funder have control of publication of research findings?

☐ Yes ☒ No

If so, please describe this potential conflict of interest, and outline what measures will be taken to address any ethical issues that might arise from the research.

F.3 Does the research involve external funding? (Tick as appropriate)

☐ Yes ☒ No

If yes, what is the source of this funding? _____

Declaration by Principal Investigator

- 1 The information in this form is accurate to the best of my knowledge and belief.
2. I take full responsibility for the information I have supplied in this document.
3. I undertake to abide by the University's ethical and health and safety guidelines, and the ethical principles underlying good practice guidelines appropriate to my discipline.
4. I will seek the relevant School Risk assessment/COSHH approval if required.
5. If the research is approved, I undertake to adhere to the project protocol, the terms of this application and any conditions set out by the Faculty Research Ethics Committee.
6. Before implementing substantial amendments to the protocol, I will submit an amendment request to the Faculty Research Ethics Committee seeking approval.
7. If requested, I will submit progress reports.
8. I am aware of my responsibility to be up to date and comply with the requirements of the law and relevant guidelines relating to security and confidentiality of participants or other personal data, including the need to register when necessary with the appropriate Data Protection Officer.
9. I understand that research records/data may be subject to inspection for audit purposes if required in future.
10. I take full responsibility for the actions of the research team and individuals supporting this study, thus all those involved will be given training relevant to their role in the study.
11. By signing the validation I agree that the Faculty Research Ethics Committee, on behalf of the University of Hull, will hold personal data in this application and this will be managed according to the principles established in the Data protection Act (1998).

Sharing information for training purposes: Optional – please mark with X as appropriate:

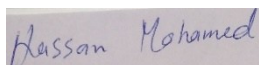
x	I would be content for members of other Research Ethics Committees to have access to the information in the application in confidence for training purposes. All personal identifiers and references to researchers, funders and research units would be removed.
---	---

Principal Investigator

Signature of Principal Investigator:

(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name:



Date: (dd/mm/yyyy):

.....4/5/2021.....

Reviewer

Signature of Reviewer:



(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name:Gunjan Saxena..... Date: (dd/mm/yyyy):
.....05/05/2021.....

Supervisor of UG and PG student research: I have read, edited and agree with the form above.



Supervisor's signature:..... (second Supervisor).....
(This needs to be an actual signature rather than just typed. Electronic signatures are acceptable)

Print name:Gunjan Saxena..... Date: (dd/mm/yyyy):
.....05/05/21.....

[mailto:](#) **Remember to include any supporting material** such as your participant information sheet, consent form, interview questions and recruitment material with your application. Version control should be adopted to include the version number and date on relevant documents in the appendices. **These should be pasted as Appendices to this form.**

One copy of the form should be kept by the researcher, one copy should be retained by the Ethics Officer and one copy should be sent by email to fblp-researchadmin@hull.ac.uk

For staff, PGR students and UG writing dissertations undertaking more complex research (particularly if this involves human participation or more significant ethical considerations) we would usually expect the following:

- **Form D** - Research Ethics Proforma (completed and signed);
- **Form E** - Invitation, Information and Informed Consent (completed);
- Detailed methodology;
- Sampling method;
- Designated sample: who are the participants, including their age;
- Consent form;
- Questionnaire.
- Data Management Plan

Appendix (D) Conclusive survey questionnaire

Preferred language:

Please select your preferred language:

- ☐ English
- ☐ Arabic

Study consent:

Hello, I am Hassan Mohamed, pursuing a PhD in Marketing at Hull University Business School, UK, carrying out a short survey (10 minutes) on the issue of food waste management among Muslim families in the holy month of Ramadan. Please note data will be anonymously coded and confidentially treated. Please email me at h.m.mohamed-2019@hull.ac.uk if you would like a summary of my findings. You can withdraw at any stage of research, and you have the right to retrieve your data.

- (confirm)

Your preferred contact (Email address, telephone number) please!

- (.....)

Filtering questions:

We, my household members and I, together decide who will be invited for our banquets in Ramadan.

- (yes)

In Ramadan, we invite: (please select all that applies)

(Immediate family / very close relatives)	
(extended family / relatives)	
(friends and colleagues)	

In Ramadan, we invite people to the banquet for socialization that we miss in other months of the

Year: please select from (1) Strongly disagree to (5) Strongly agree:

- (.....)

Demographics:

Marital status:

Married	
Married with children	
Divorced	
Divorced, with children	
Widowed	
Widowed with children	

The number of family members including you is:

- (.....)

Age (in years):

Less than 20	
20 to less than 30	
30 to less than 40	
40 to less than 50	
50 to less than 60	
60+	

Education level:

Less than high school	
High school	
Graduate	
Post-graduate	
Other	
Please specify: (.....)	

Work:

Unemployed housewife	
Retired	
Part time	
Full time	

Managerial level if you are working:

Direct management	
Middle management	
Top management	

Family monthly income:

Less than \$500	
From \$500 to less than \$1000	
From \$1000 to less than \$3000	
\$3000+	

I live in:

Urban area	
Non-urban area	

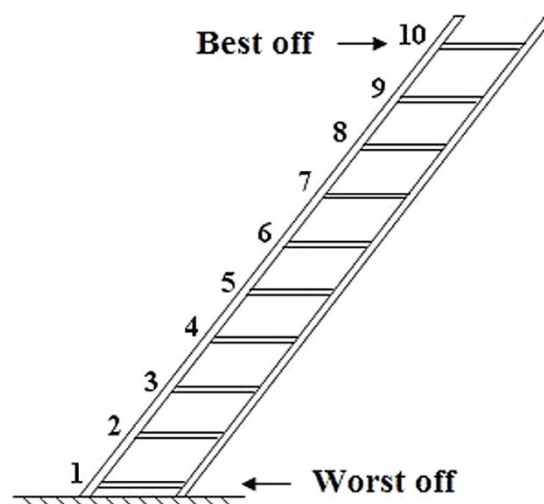
Country of residence:

Egypt		UAE	
Morocco		Bahrain	
KSA		Algeria	
Oman		Lebanon	
Tunisia		Kuwait	
Jordan		Qatar	
Turkey		Indonesia	
Malaysia		Others: please specify (.....)	

Socio economic status:

Think of this ladder as representing where people stand in our society. At the top of the ladder are the people who are the best off, those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off, those who have the least money, least education, and worst jobs or no job."

- Please write the number that best presents your family status
○ (.....).



Food waste generation: (Q12_1_a : Q12_4_a)

- The amount of food I have thrown away in a recent week because ...

Statement: from 1=Too little to 5=Too much	1	2	3	4	5
It has passed the best-before-stamped date.					
It has been damaged or moulded (e.g., the stale bread stored in the fridge or cupboards).					
I had leftovers and I had not used for another meal.					
I cooked more than I needed, and I have not used it for another meal.					

COVID-19 impact: (Q15_1_a : Q15_3_a)

The impact of the COVID-19 pandemic on the Holy month of Ramadan (2021)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
The COVID-19 pandemic has reduced the number of banquets in Ramadan.					
The COVID-19 pandemic reduces the number of invited guests for each banquet we hold in Ramadan.					
The COVID-19 has reduced the food waste in Ramadan.					

Household chores:

Banquets- excess food drivers (compensation behaviour):

- How many banquets does your family typically host during the Ramadan?
 - How many banquets does your family usually host per year excluding the Ramadan period?
 - Muslims prepare extra food for their banquets in Ramadan to: (Q18_1_a: Q18_5_a)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
show the family's generosity.					
overcome the feeling of loneliness by connecting to others.					
impress the neighbours.					
accommodate the additional guests that invited guests may bring along (including extended family members, neighbours, etc.)					
impress the guests.					

Banquets food waste volume: (FWvolume)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
The generated food waste from the last hosted banquets was reasonable.					

Religiosity effect: (Q13_1_a: Q13_7_a)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
Religious beliefs influence all my behaviours in life.					
My religious beliefs lie behind my whole approach to life including how I consume and store food.					
Religion doesn't promote excessive consumption of food.					
I enjoy socialising with other Muslims over food and drink.					
I donate food to charities and religious organizations.					
A religious person balances food, drink, and his/her needs.					
A religious person doesn't consume food excessively.					

Banquets- religious teachings: (Q14_1_a : Q14_3_a)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
In Ramadan, we invite people for Islamic traditions (i.e., family connectedness) since the prophet (PBUH) said, "He who believes in Allah and the Last Day, let him maintain good the ties of blood relationship"					
In Ramadan, we invite people to jointly break the fast since the prophet (PBUH) said, "He who provides a fasting person something with which to break his fast, will earn the same reward as the one who was observing the fast, without diminishing in any way the reward of the latter."					
In Ramadan, we invite people to our house to show our generosity since the prophet (PBUH) said, "He who believes in Allah and the Last Day let him show hospitality to his guest".					

Break:

Where did you spend your last vacation? (.....)

- To what extent did you experience this vacation? (select all that applies)
 - ☐ I enjoyed it a lot and was very happy.
 - ☐ I had better sleep.
 - ☐ I loved the sea
 - ☐ I liked the socialization.
 - ☐ Other, please specify.....

Materialism: (Q21_1_a : Q21_9_1)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
I admire people who own expensive homes, cars, and clothes.					
The things I own say a lot about how well I'm doing in life.					
I like to own things that impress people.					
I try to keep my life simple in regards to possessions.					
Buying things gives me a lot of pleasure.					
I like to have a lot of luxurious items in my life.					
My life would be better if I owned certain things I don't have.					
I'd be happier if I could afford to buy more things.					
Sometimes, it bothers me quite a bit that I can't afford to buy all the things I'd like.					

Loneliness feeling: (Q22_1_a : Q22_6_a)

Statement from 1=strongly disagree to 5=strongly agree	1	2	3	4	5
There are plenty of people I can rely on when I have problems.					
There are many people I can trust completely.					
There are enough people I feel close to.					
I experience a general sense of emptiness.					
I miss having people around.					
I often feel rejected.					

Any other comments.....

Thank you so much for your time.